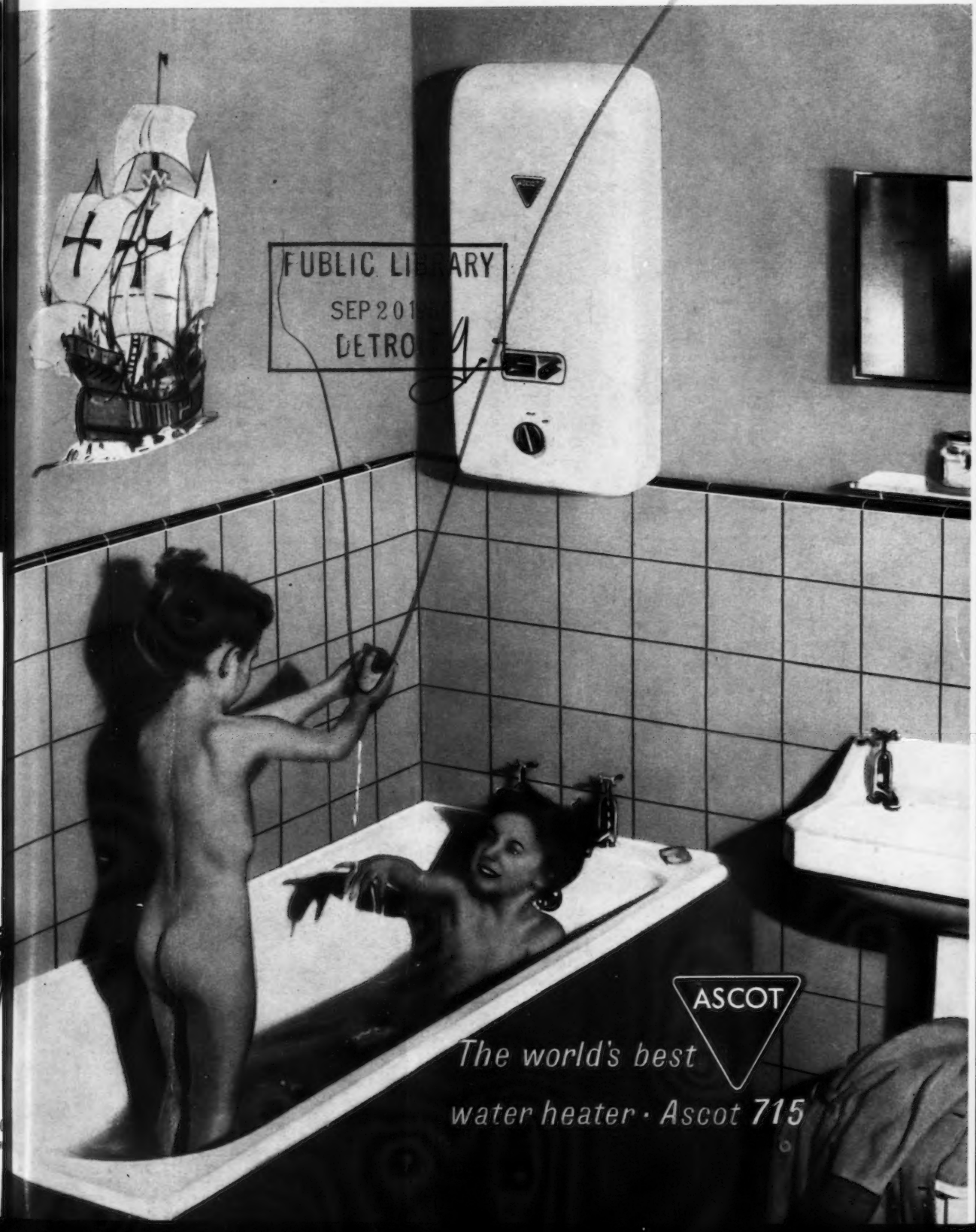
TECHNOLOGY DEPARTMENT

Gas Journal

VOL 279. 106TH YEAR. LONDON, SEPTEMBER 8, 1954. NO. 4762. PRICE 1/3



Steel Bunkers and Chimneys at Power Stations and Works are usually lined with GUNITE which withstands abrasion and chemical attack without adding seriously to the weight.

GUNITE

puts longer life into Bunkers

The Gunite process, developed by the Cementation Co., Ltd., has a successful record of over 25 years as a facing for both new and dilapidated structures.

It is water, weather, and fireproof, and has great mechanical strength and hardness. Its adhesion to concrete is greater than the strength of the concrete itself.

Write for your copy of the Gunite booklet which illustrates and describes its characteristics and applications for factories, chimneys, wharves, water towers, reservoirs, sea walls, silos, etc.

The CEMENTATION COMPANY LIMITED

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The LATEST

Low Pressure
SERVICE
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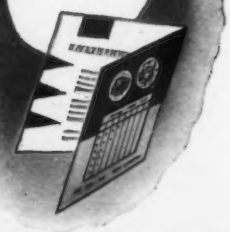
WRITE FOR FULL SPECIFICATION



THE BRYAN DONKIN COMPANY LIMITED

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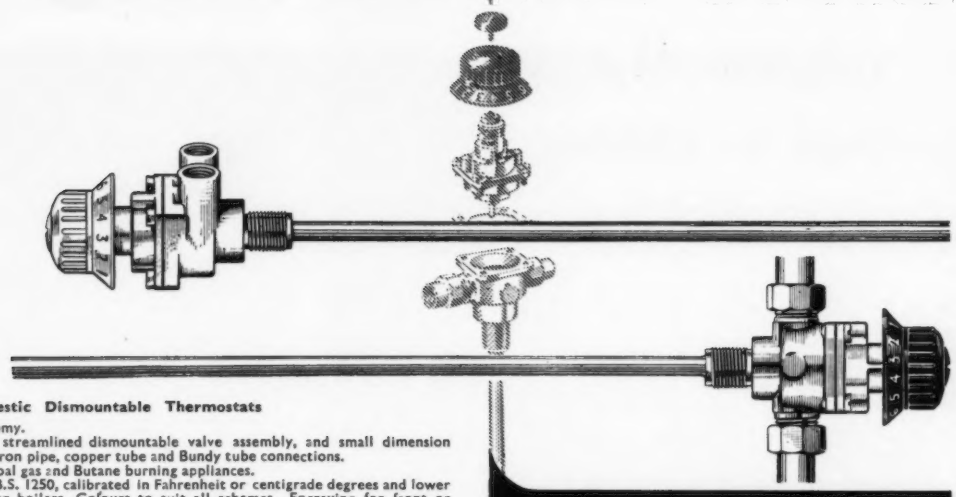
CHESTERFIELD · LONDON · MANCHESTER

DOMESTIC DISMOUNTABLE THERMOSTATS



Domestic Dismountable Thermostats

Extreme simplicity and economy.
Completely redesigned with streamlined dismountable valve assembly, and small dimension body. Patterns available for iron pipe, copper tube and Bundy tube connections.
Interchangeable models for coal gas and Butane burning appliances.
Dials available calibrated to B.S. 1250, calibrated in Fahrenheit or centigrade degrees and lower temperature ranges for water boilers. Colours to suit all schemes. Engraving for front or side mounting.
Fixed or variable by-pass.
TR. 536 Coal gas thermostats with straight through connections on body.
TR. 536B. Butane thermostats with straight through connections on body.
TR. 541. Coal gas thermostats with "U" type connections.
TR. 541B. Butane gas thermostats with "U" type connections.

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GEORGE GLOVER & Co. Ltd.

DOMESTIC METERS
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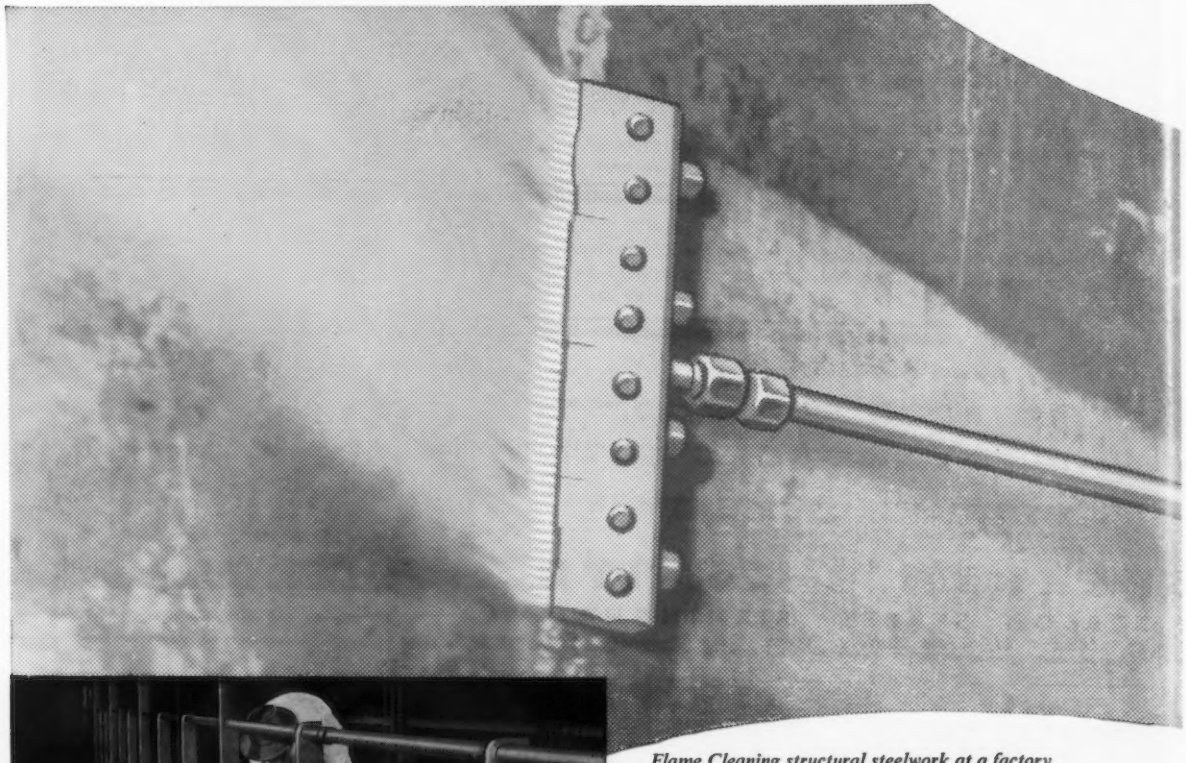
Product of Radiation Ltd

GAS METERS

122, KINGS RD. CHELSEA LONDON, S.W.3.
Branch works
WARRINGTON · LEEDS · MANCHESTER · CARDIFF.

B.O.C Flame Cleaning strips



Flame Cleaning structural steelwork at a factory where corrosive atmosphere has destroyed the paint coat and caused heavy rusting of the steel.

The B.O.C Flame Cleaning process does the work fast, and does it well. With a steady sweep of the Flame Brush the toughest scale falls clear, and rust becomes harmless oxide dust in a few seconds. On the clean, warm surface thus provided, paint bonds perfectly—which means far longer protection and a big saving in overhaul costs.

Flaws in the metal surface are revealed and can be treated, thus removing all risk of premature corrosion.

Perhaps B.O.C Flame Cleaning can cut maintenance costs in your business, too. Write for a copy of B.O.C Technical Information Bulletin No. II — it gives all the facts.

scale fast...

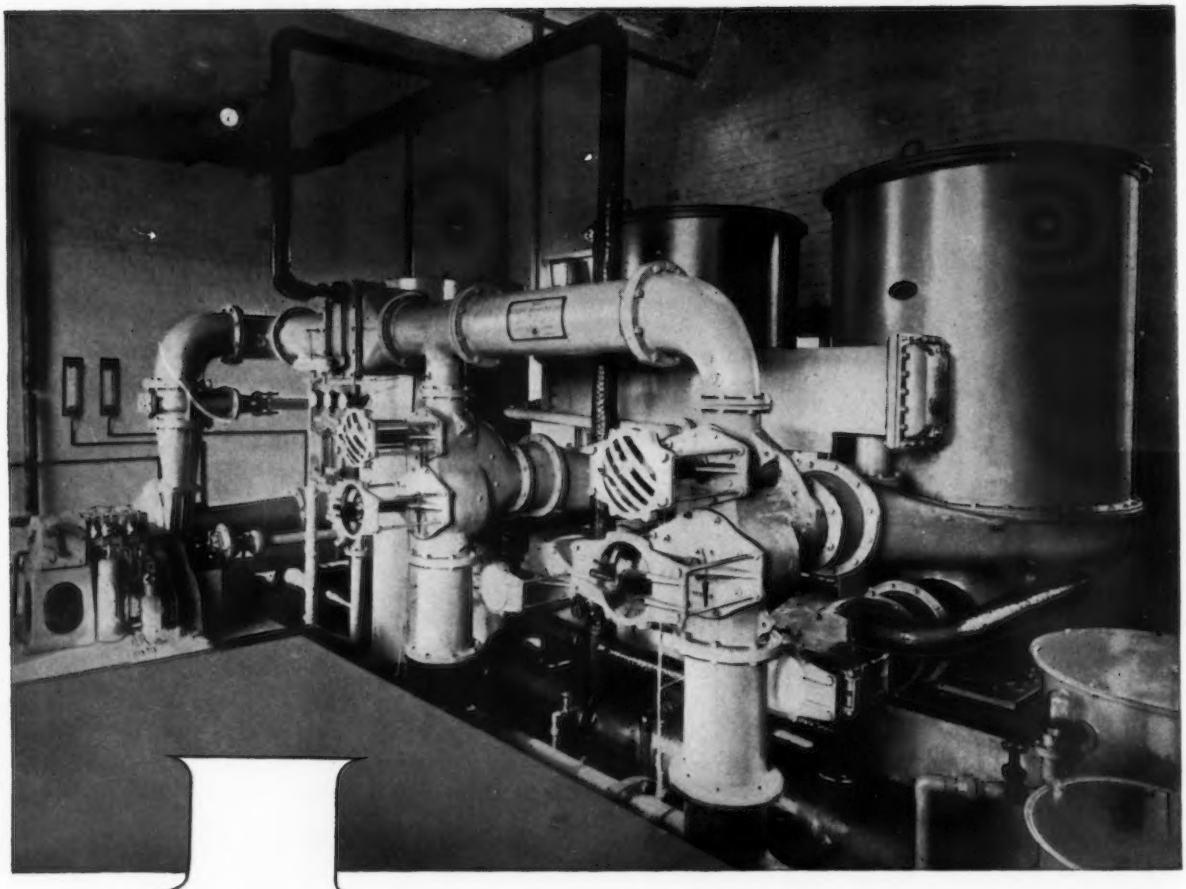
BIG AREAS AND TRICKY CORNERS are thoroughly cleaned—a perfect paint-bonding surface left

Shown above and below are detail photographs of the work before and after Flame Cleaning. Note the clean, smooth surface—on which paint bonds perfectly.

WINGS DAY SEPT 18th Give for those who Gave

THE BRITISH OXYGEN CO LTD

LONDON AND BRANCHES



100% recovery of Benzole

HAS BEEN RECORDED

100% recovery of Benzole has been recorded in the Gas Industry where Sutcliffe Speakman plants of the type illustrated are already installed.

These recovery plants are the result of over twenty years' experience in the manufacture and industrial use of Active Carbon. Their capacities range from 250,000 cu. ft. per day. Entirely automatic and with few moving parts, they are compact, clean in operation, and economical to run. Their initial cost, too, compares favourably with that of other recovery systems. In every way they are the most profitable investments. We are always ready to draw up a complete balance sheet for Benzole recovery in any specific undertaking of the Gas Industry.

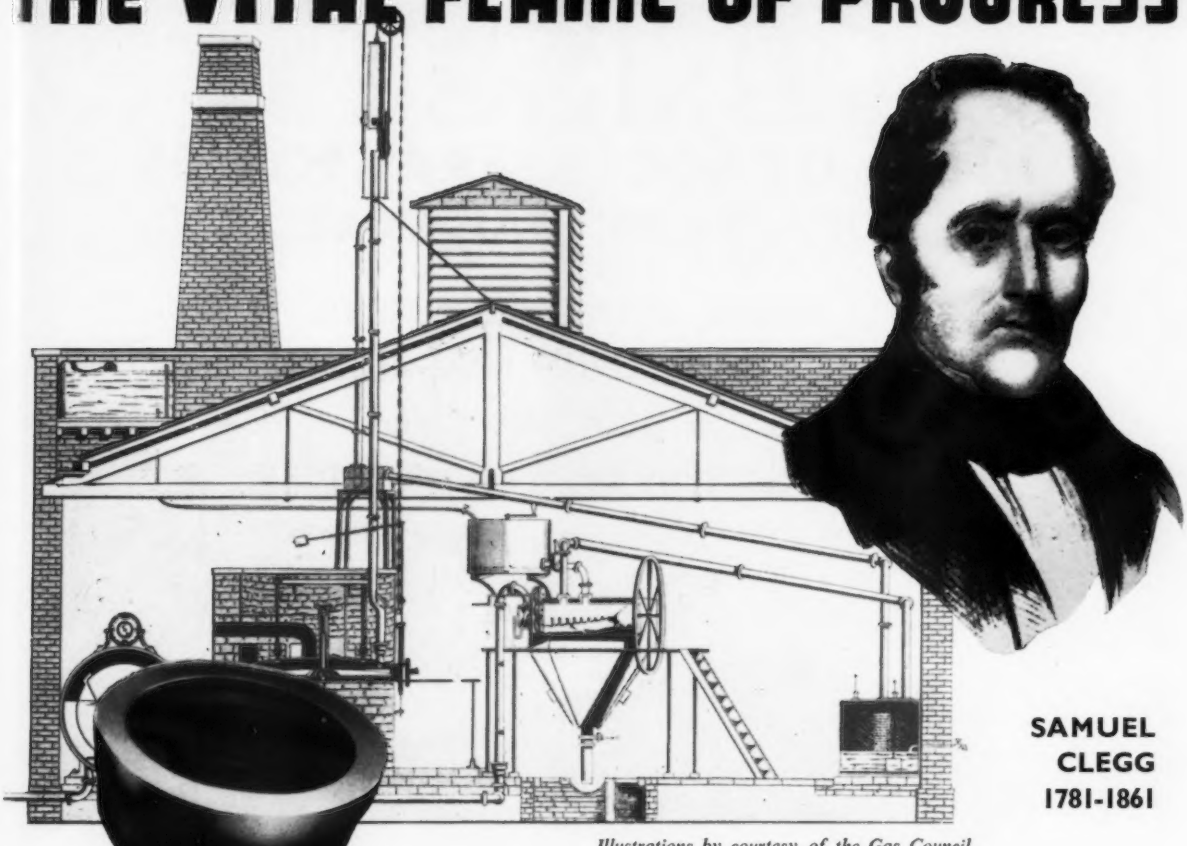
to cut Benzole wastage to a minimum, consult

SUTCLIFFE SPEAKMAN

SUTCLIFFE SPEAKMAN AND COMPANY LIMITED, Leigh, Lancashire

Telephone: Leigh 94. London Office: 2 Caxton Street, Westminster, S.W.1. Telephone: ABBEY 308

THE VITAL FLAME OF PROGRESS



SAMUEL CLEGG 1781-1861

Illustrations by courtesy of the Gas Council.

A Mancunian, born in 1781, played an important part in the engineering of early gas plants and particularly in the purification of gas before distribution.

For many years Staveley pipes have been recognised the world over as of the highest attainable standard for Gas Mains.

SAND & METAL SPUN PIPES FOR GAS

THE STAVELEY IRON & CHEMICAL CO. LTD. NR. CHESTERFIELD

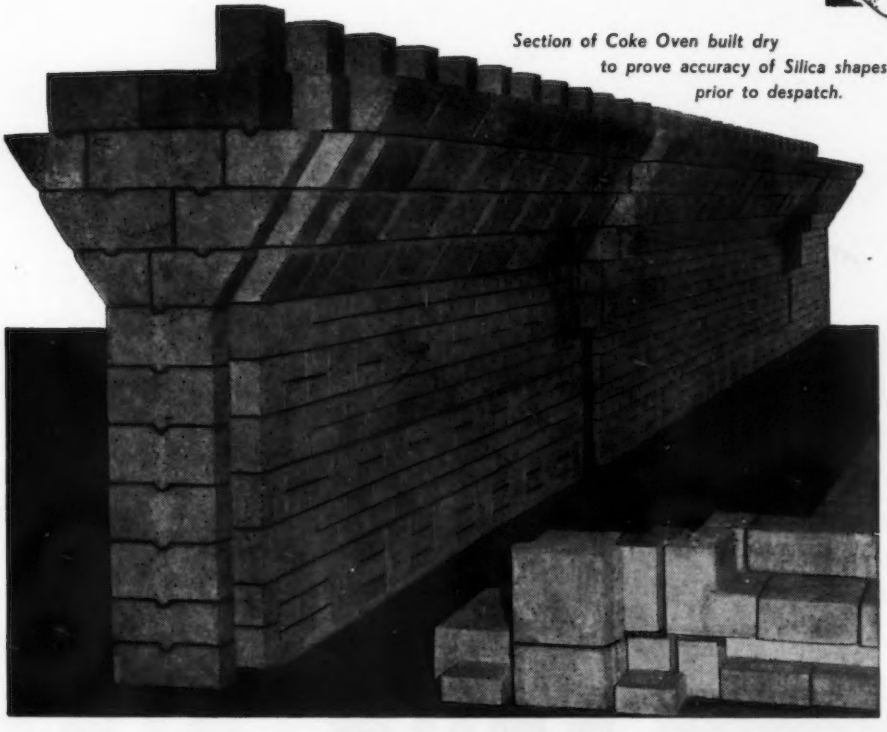
CONSETT

HIGH GRADE REFRACTORIES
FOR COKE OVENS, GAS WORKS, ETC.

SILICA BRICKS, SHAPES and CEMENTS
SPECIAL NON-SPALLING HIGH-ALUMINA MATERIALS FOR DOOR JAMBS and BOTTOM SECTIONS OF VERTICAL RETORTS

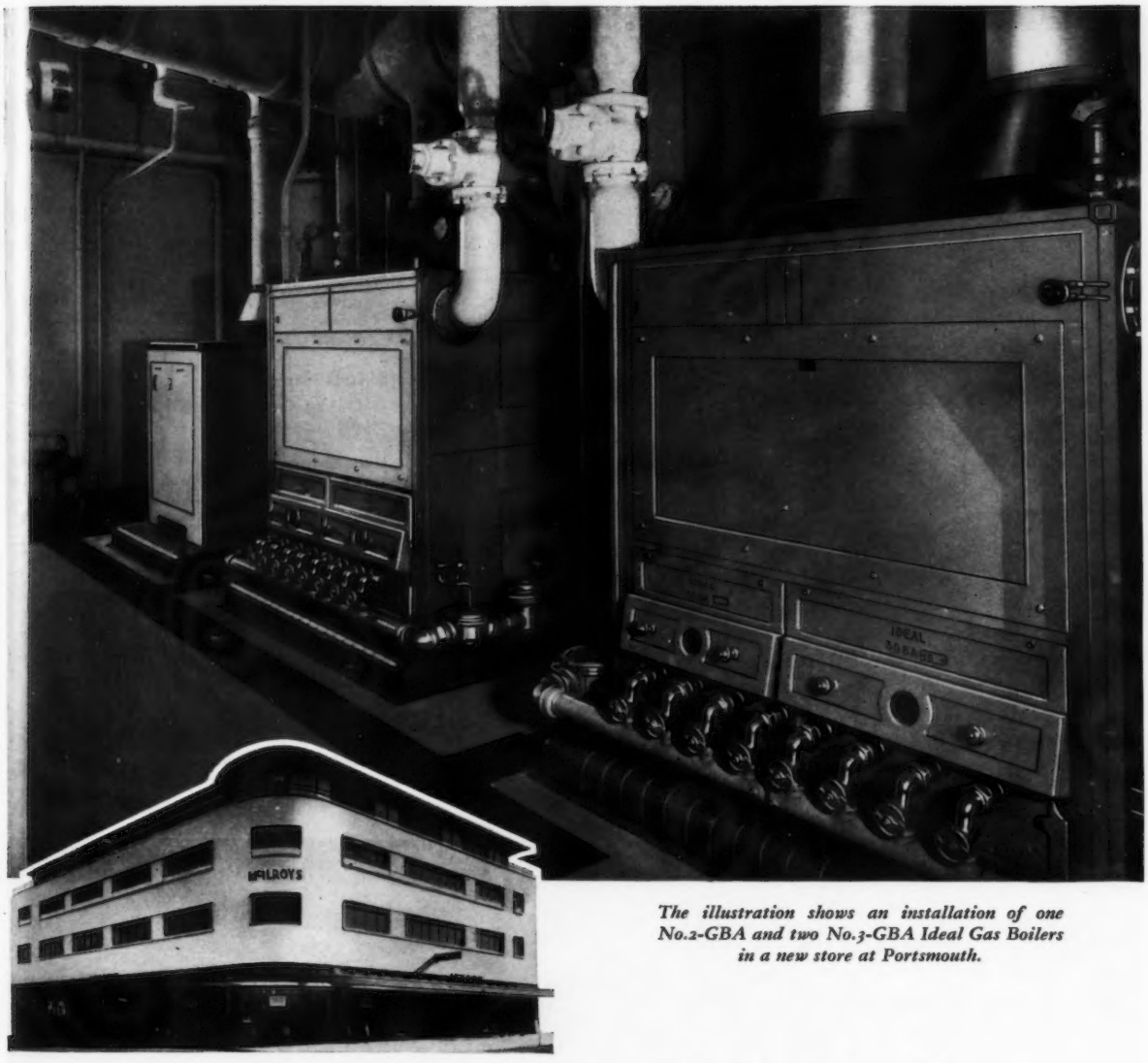
Our Technical Department is always available for consultations on recent developments.

Section of Coke Oven built dry to prove accuracy of Silica shapes prior to despatch.



IT PAYS TO USE CONSETT REFRACTORIES

CONSETT IRON COMPANY LIMITED
CONSETT · CO. DURHAM · ENGLAND
TELEPHONE: CONSETT 341 (10 LINES) TELEGRAMS: STEEL, PHONE, CONSETT



The illustration shows an installation of one No.2-GBA and two No.3-GBA Ideal Gas Boilers in a new store at Portsmouth.

. . . designed for modern efficiency

High functional efficiency, clean, labour-saving operation and long, trouble-free service are the features which have created such a demand for the installation of Ideal Gas Boilers in reconstruction and new building throughout the country.

These boilers comply with the wishes of the Ministry of Town and Country Planning, and many local authorities, who encourage the installation of smoke-less heating equipment in the interests of a clean, healthy atmosphere, now ardently desired by all.

In a range of 22 sizes, from 20,000 to 1,430,000 B.T.U. per hour, Ideal Gas Boilers are completely thermostatically controlled and have insulated jackets of steel or aluminium in appropriate finishes. They are the result of long experience and much research in this specialised type of heating and their growing popularity is a measure of their success.

IDEAL GAS BOILERS

RELIABLE AND LABOUR SAVING

IDEAL BOILERS & RADIATORS LTD • IDEAL WORKS • HULL

IDEAL-Standard

241

Protection in Gas Production

Humidine
non-setting paint

Used by

Almost every major gas undertaking in the U.K.

Used on

Lower lift plates and cuppings, purifier lutes, governor bells, meter drums and wherever metal is not in physical contact.

Used because

One coat forms an impenetrable permanent barrier against corrosion.

Humidine never dries — therefore it never cracks or needs renewal. Impervious to moisture—can be applied under water.

THE FIRST PAINT TO BE SPECIALLY PREPARED FOR THE GAS INDUSTRY

Send for full information and technical data:-

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NEAT GAS JETS

NON-ATMOSPHERIC AND
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for COAL GAS
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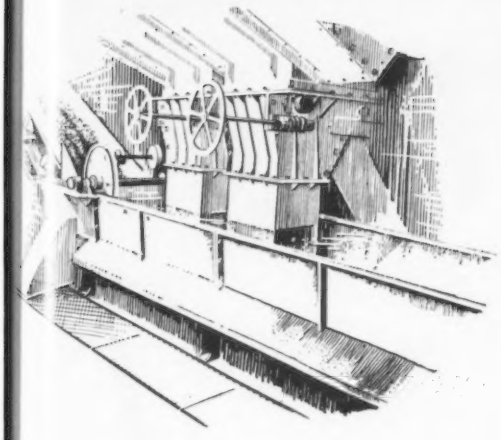
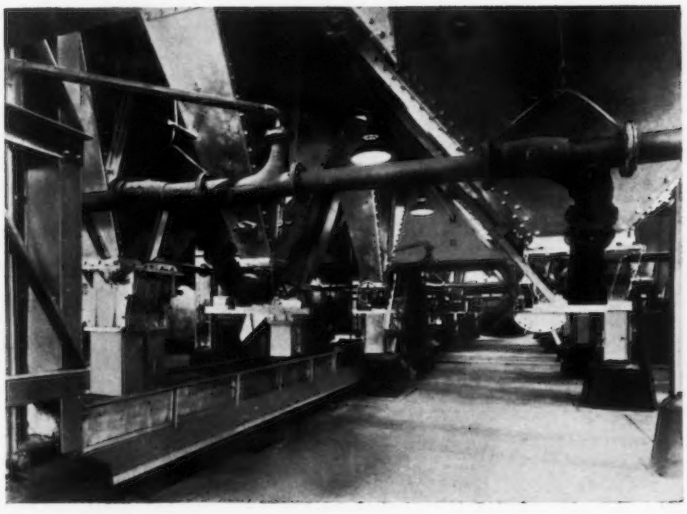


Mechanised, continuous, and dustless removal of ash residues from all types of boiler plants, refuse disposal plant, gas retorts, locomotive ash pits and the like, is provided for in the design of the John Thompson Submerged-Belt Ash Conveyor.

The operation of this conveyor system is described in a leaflet which we have just published; copies of this leaflet will be sent to all engineers who are interested in this particular kind of plant.



JOHN THOMPSON CONVEYOR COMPANY
ETTINGSHALL, WOLVERHAMPTON

EXHAUSTERS

Roots Type

Capacities up to One Million cubic feet per hour

GEORGE **WALLER** AND SON LTD

PHOENIX IRON WORKS · STROUD · GLOS

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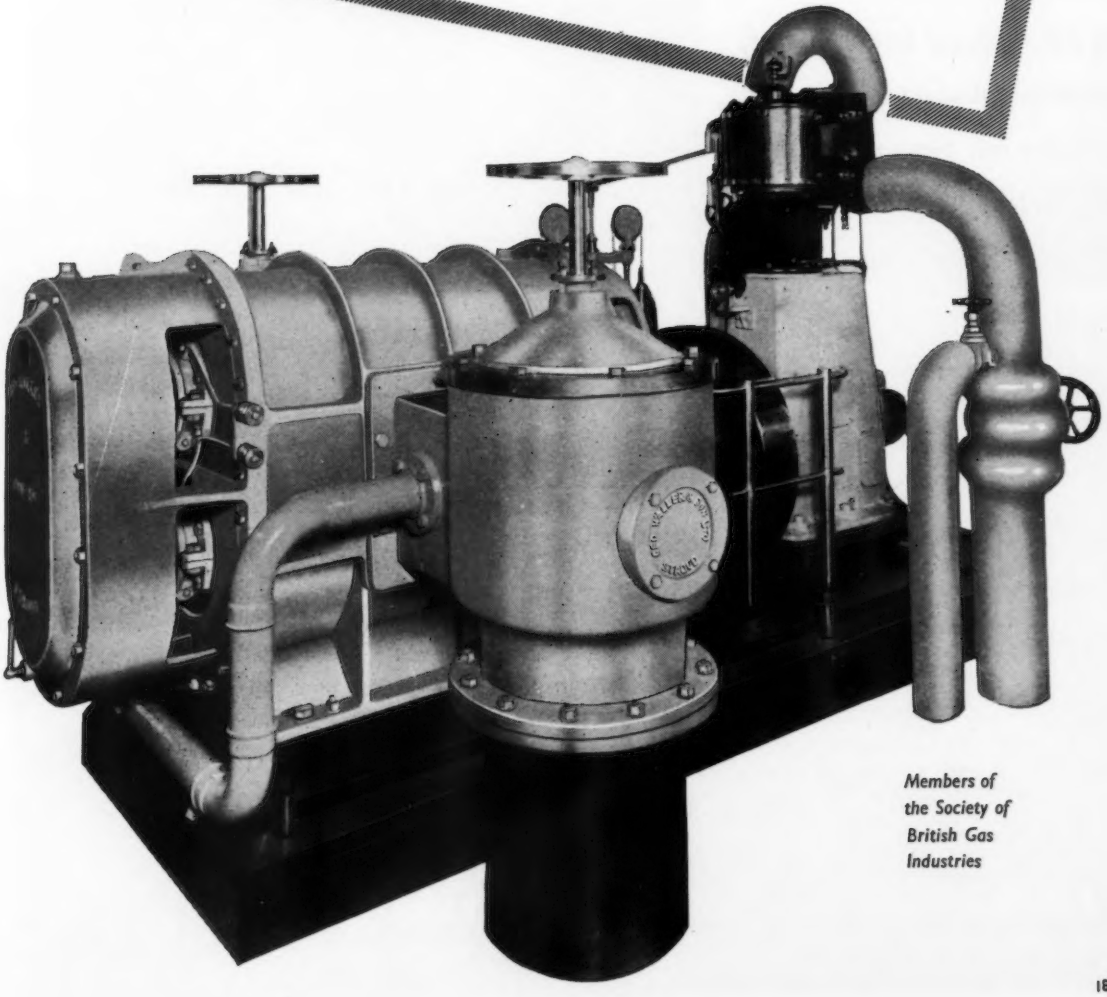
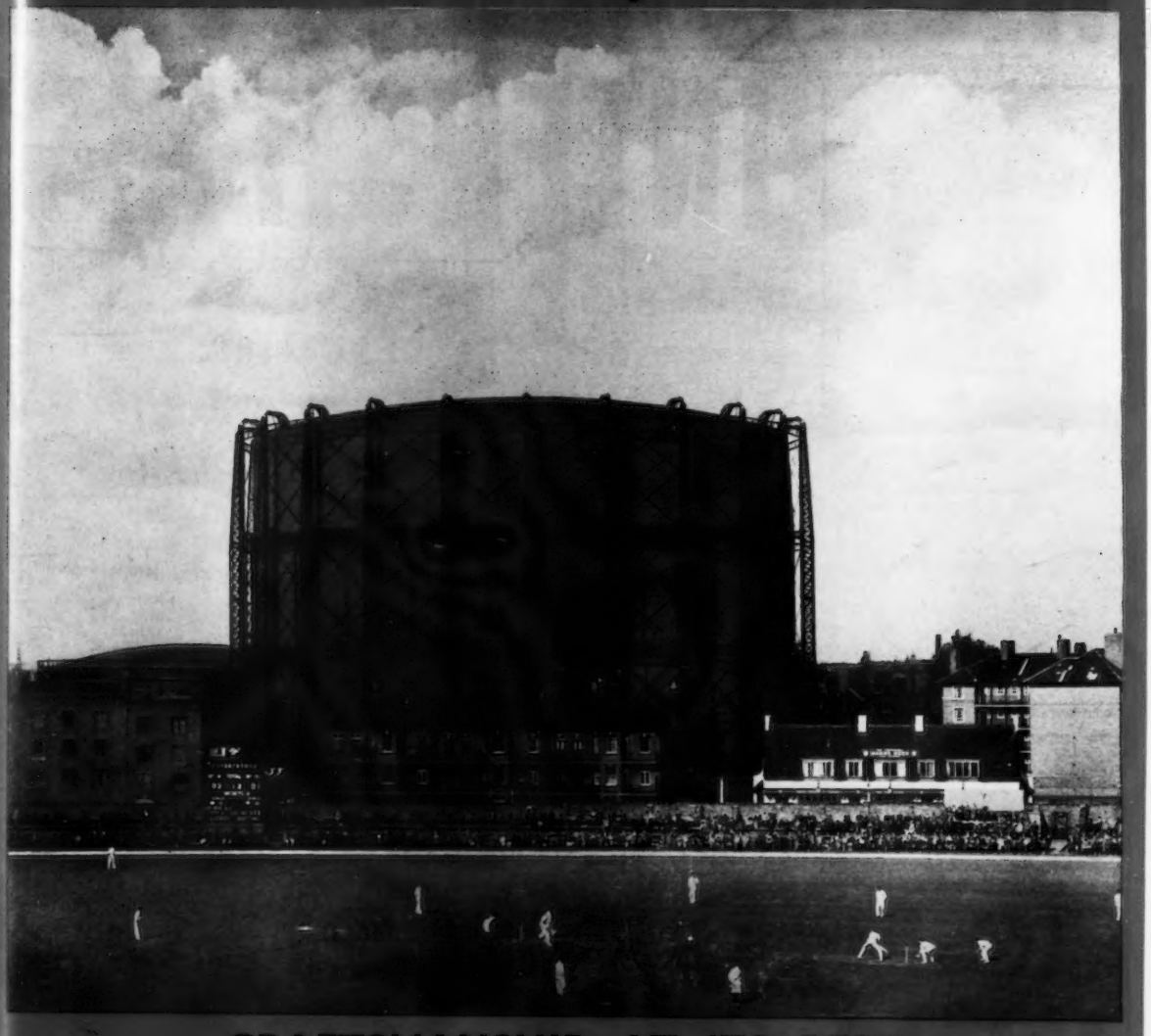


Members of the Society of British Gas Industries

IB409

"Good Sportsmen & Good Friends!"



CRAFTSMANSHIP AT ITS BEST
ON AND OFF THE FIELD

SURREY—COUNTY CHAMPIONS—1952-1953-1954

The 6 Million Frame Guided Gasholder at Kennington Oval, was reconstructed following war damage, by Claytons of Leeds; in the background . . . the new 2 million Spiral Guided Holder, also erected by Claytons to replace another war-damaged Holder.

Gasholders of all Types by

CLAYTON SON & CO. LTD.
HUNSLET LEEDS YORKSHIRE

WAR AGAINST SCALE INTENSIFIES!

BIG UNDERTAKINGS APPOINT GENERAL DESCALING, M.C.E.*

Veteran Commando given "Liberate Our Mains" Commision

Anti-Scale Headquarters, Wed. — Scale simply can't win—can't even ma a stand—against the superior strategies and equipment deployed by *Gener Descaling*. Latest report from advanced positions show that scale is on the r —even from its most deeply entrenched strongholds—wherever *General De caling's* picked mechanical or chemical forces go in after hidden-enemy Scal

"WE HAVE THE EQUIPMENT"

*says General Descaling, M.C.E.**

" Our equipment for routing out scale is the finest and most up-to-date, enabling us to carry through descaling and mains-maintenance operations with the utmost expedition and the least disturbance of service. Each of our power-driven Boring Machines, for example, descales up to 300 yards from one surface cut; breaks up the hardest deposit but will not damage pipes or ferrules. With these and other specially designed equipment we 'out' scale wherever we're 'put in'!"

* Mechanical and Chemical Engineer.

MAINS REHABILITATION

General Descaling is the implacable foe of scale wherever found. The sw rehabilitation of gas mains from 1½" to over 36" in diameter is the chief objecti and this at a fraction of the cost of relaying—often the only alternative.

"OPERATION DESCALING" IN LINCOLN

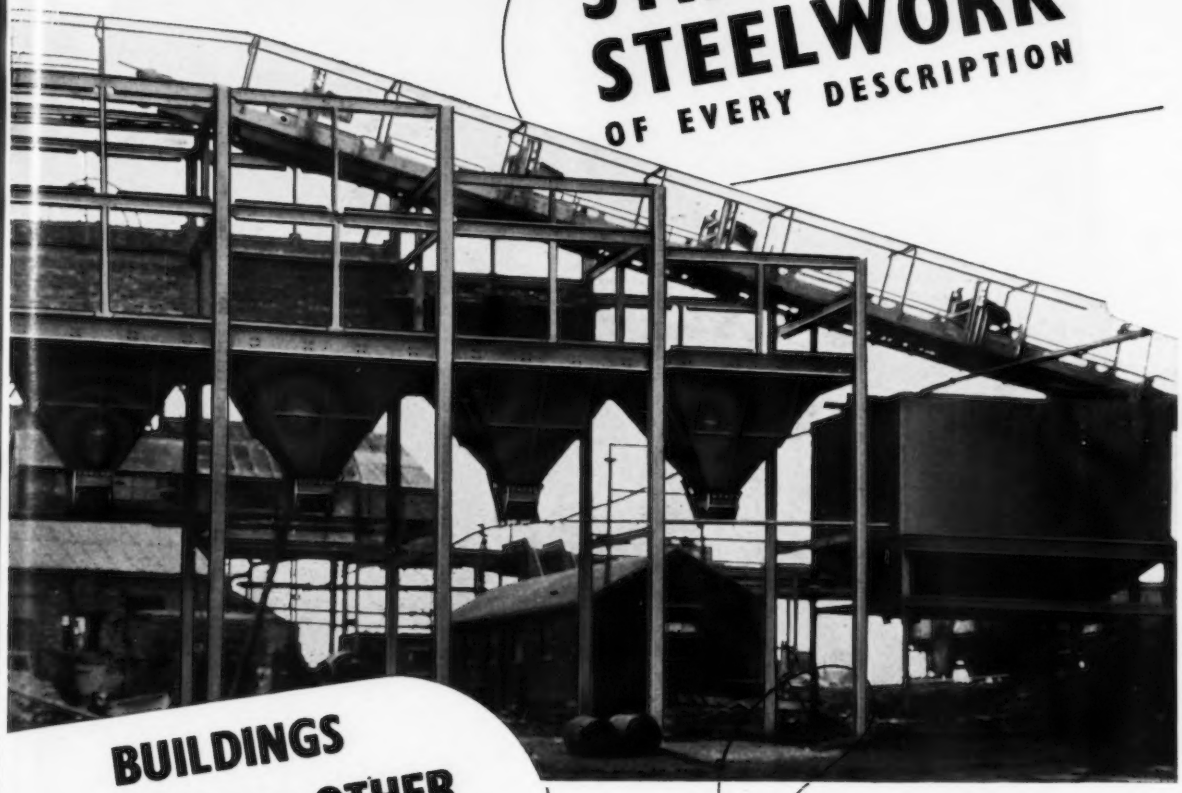
Boring a gas main at Woodhall Spa. The flexible pipes terminating in the Johnson coupling (right) are the connections from the main to a surface by-pass. The close-up on left shows the scale—reduced to a free-flowing sludge—pouring out of the main being cleaned.

ANTI-SCALE INVASION FORCES

under General Descaling are ready and equipped to tackle scale *anywhere* at a moment's notice. Write or phone details of your scale problem to :

GENERAL DESCALING CO. LTD., H.Q. WORKSOP, NOTTS. Tel.: 3211

STRUCTURAL STEELWORK OF EVERY DESCRIPTION



Set of 4 Coal Bunkers for N.W. Division, National Coal Board, complete with feeding conveyor.

BUILDINGS
MACHINE AND OTHER ASSEMBLIES
RIVETED OR WELDED

The illustration shows one example of our exceedingly wide range of fabrications. These include Steel Framed Buildings of all descriptions. Coal and Coke Handling Plants, Steel Pipes up to 84″ diameter automatically welded, and special equipment for the Coke Oven, Mining and Chemical Industries.

SHELTON IRON STEEL & COAL CO. LTD

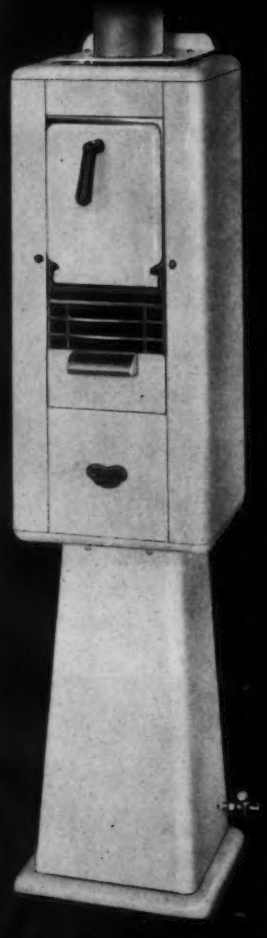
Structural Steelwork

SHELTON IRON STEEL & COAL CO. LTD • STOKE-ON-TRENT • STAFFS • Telephone: STOKE-ON-TRENT 5321

Branch Offices

BIRMINGHAM · LONDON · MANCHESTER

Personal Hygiene and Public Health demand.....



This Pedestal Model No. 3706 is one of the range of SUGG Incinerators Gas-Fired suitable for .....

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INSTITUTIONS
SCHOOLS
HOTELS ETC.

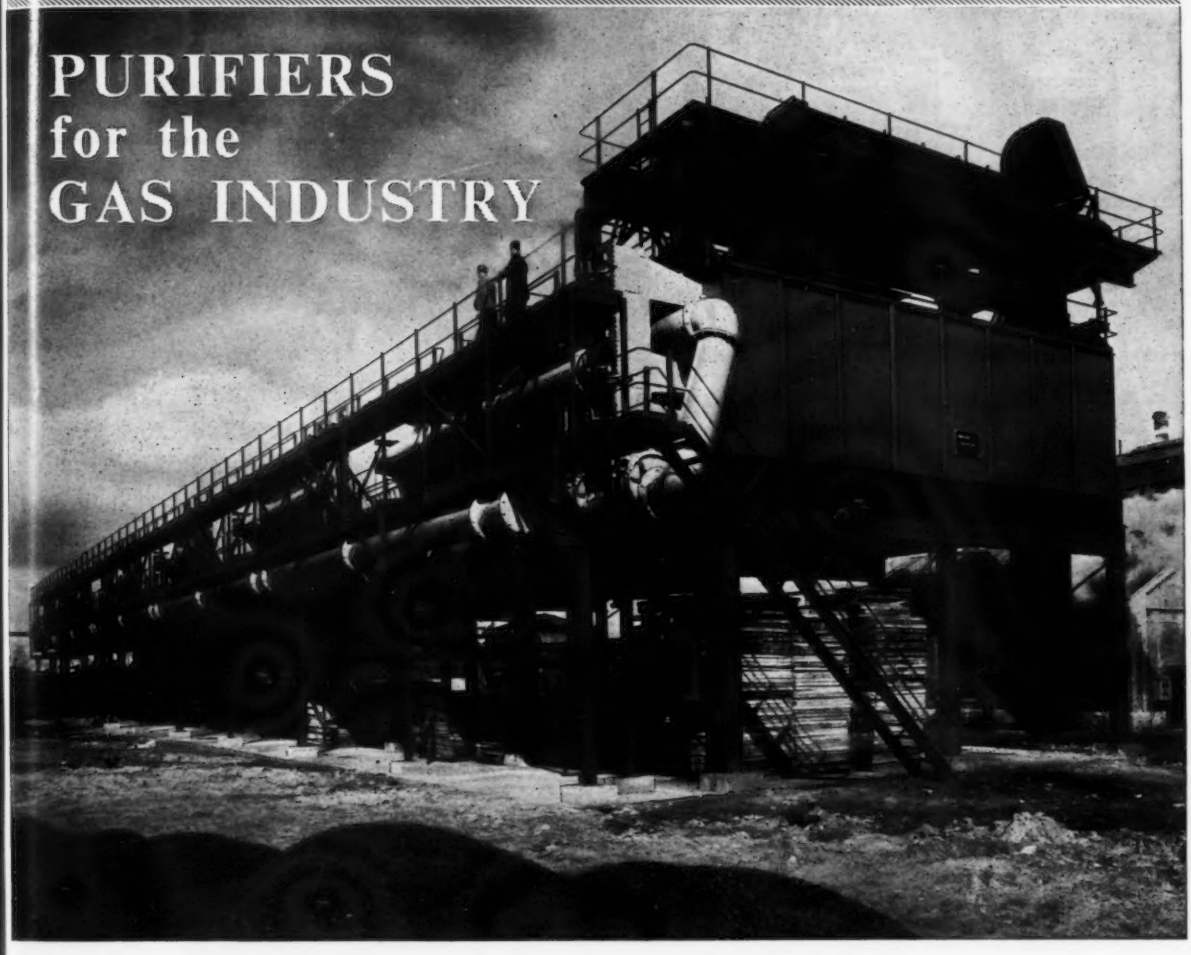
The Sugg Incinerator Gas-Fired

Literature SUGG WESTMINSTER upon request

WILLIAM SUGG & COMPANY LIMITED
(Incorporating COWPER PENFOLD & CO. LTD.)

VINCENT WORKS, REGENCY STREET, LONDON, S.W.1. Tel: VICTORIA 3211 (4 lines)

WHESSOE



The illustration shows a recent installation at Warrington. It consists of five welded steel oxide purifier boxes, each 45 ft. 9 ins. by 35 ft. by 10 ft. deep, and was designed, fabricated and erected by Whessoe to the order of the North Western Gas Board.

The plant treats 6 million cubic feet of gas per day. Whessoe design and erect a wide range of gas plant and welcome enquiries.

WHESSOE *CAPITAL PLANT FOR THE GAS AND COKE OVEN INDUSTRIES*

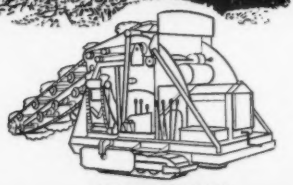
AN ADVERTISEMENT OF WHESSOE LTD · DARLINGTON · TEL: 5315 (5 lines) · LONDON OFFICE: 25 VICTORIA ST · LONDON · SW1 · TEL: ABBEY 3881
W48

12/21 MODEL FOR NARROW TRENCHES

The answer to all your trenching problems

ALLEN *Super Duty* TRENCHERS

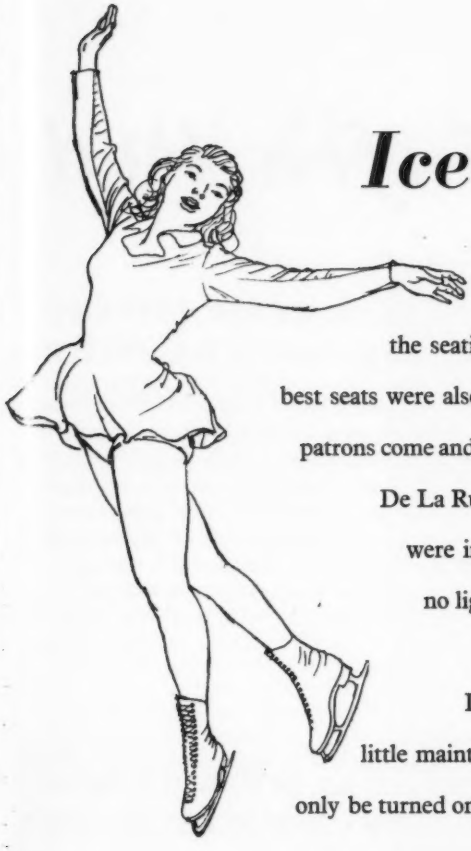
For narrow trenches we supply the 12/21 model, and for wide trenches the 16/60 model. Both models are a fine engineering job and capable of standing up to continuous hard work. We shall be pleased to send you further information and fully illustrated brochures on request.



16/60 TRENCHER

JOHN ALLEN & SONS (OXFORD) LTD. COWLEY OXFORD *Tel 77155/6/7*

LININGS · SPLASHBACKS · TRAYS · LININGS · SPLASHBACKS · TRAYS · LININGS · SPLASHBACKS · TRAYS ·



Ice and Infra Red . . .

Whenever an Ice Show was staged at the Brighton Sports Stadium the seating was extended to cover part of the ice itself. This meant that the best seats were also the coldest. It used to be quite a problem, but now the rinkside patrons come and glow. De La Rue Infra Red Space Heating Panels have been installed.

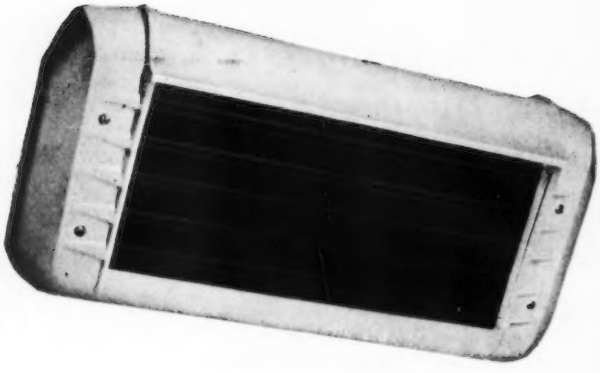
De La Rue Space Heaters are gas-fired and non-luminous. A total of 22 panels were installed in front of the gallery rails. Being silent in use and emitting no light, the panels cause no interference with the performance even when the auditorium is darkened and ultra-violet lighting used.

De La Rue Infra Red Space Heaters are easy to fix and require very little maintenance. They are safe and simple to operate and, because they need only be turned on a few minutes before warmth is required, they are economical to run.

DE LA RUE
INFRA RED
SPACE HEATERS

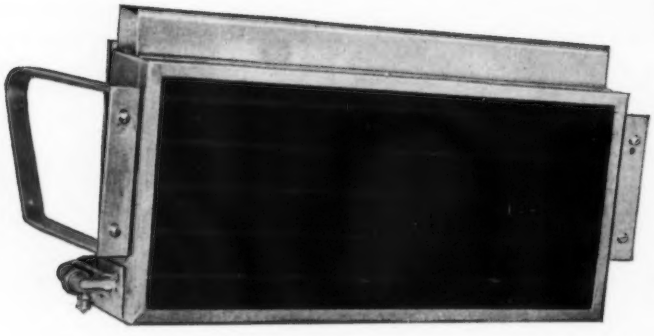
keep people warm

. . . *Infra Red*



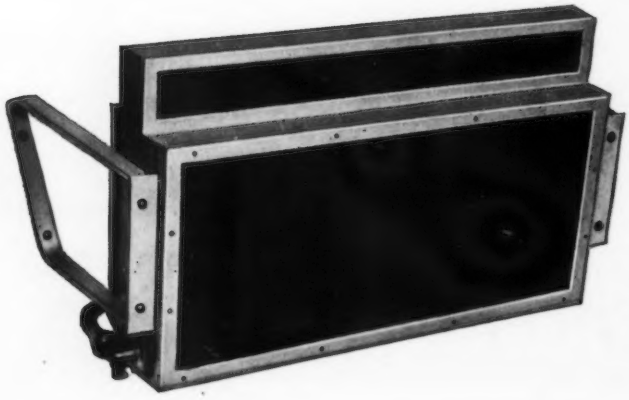
THE DE LA RUE *STYLISED* INFRA RED SPACE HEATER

This attractive heater is designed for churches, assembly halls, department stores, temporary offices—anywhere, in fact, where frequently opened doors cause heat losses, or in buildings which are used infrequently or for short periods. Stylised panels are fitted with chain cock controls for individual operation. Styled to harmonise with all interiors, the panel surround is vitreous enamelled in a Silver-Grey, Buff or Green mottled finish.



THE DE LA RUE *INDUSTRIAL* INFRA RED SPACE HEATER

The industrial heater is recommended for factories or industrial buildings where heat losses are high. It provides localised heating for work areas in large, airy buildings and is particularly effective in maintaining comfort conditions in such places as despatch sheds, loading bays etc. Each panel is fitted with chain cock control for individual operation and the panel casing is treated with a heat resisting aluminium finish.



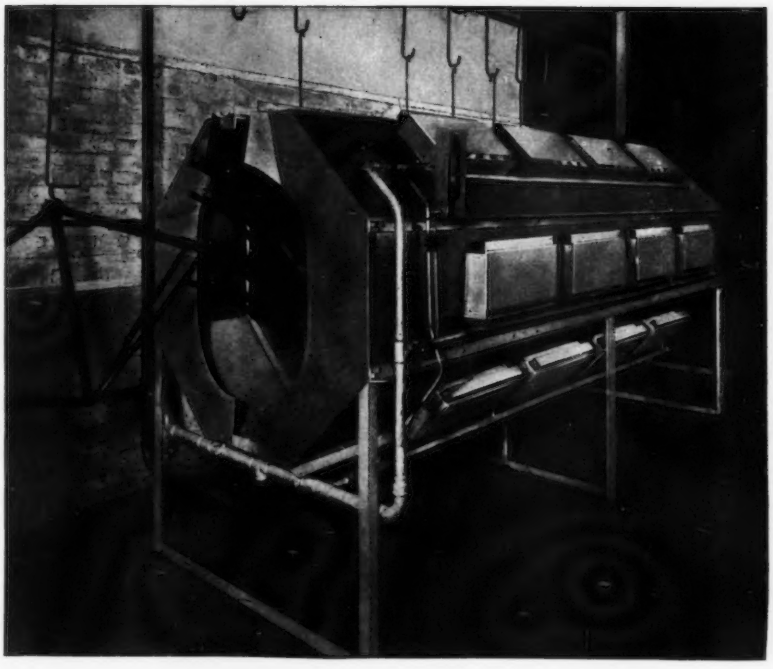
THE DE LA RUE *SAFETY* MODEL INFRA RED SPACE HEATER

By applying the principles used to prevent a miner's lamp causing explosions, De La Rue have produced a Safety Model Infra Red Heater which can be operated without risk in garages or storage spaces where petrol or other inflammable fumes are present. The Safety Model is approved by the necessary authorities on safety, but the positions, including mounting height, should be agreed with the appropriate local authorities. This done, it does not normally attract additional fire insurance.

and De La Rue

THE DE LA RUE INFRA RED PROCESS PANEL

The unit principle of constructing drying-tunnels, made possible by the use of De La Rue Infra Red Process Panels, has great advantages. Its versatility is governed only by the flexibility of the conveyor system used, and panels may be added to existing tunnels without the necessity for a complete shut-down. *De La Rue maintain a Demonstration Centre in London which offers free advice and research on Infra Red Processing problems and techniques.*



SPECIFICATIONS

Dimensions of emitting surface	19½″ × 8½″	Space Heaters fitted with gas pressure governors	
Heat Input	11,000 B.Th.U. per hour	Service pipe sizes	½″ B.S.P. up to 2 panels
Burners	Silent neat flame		¾″ B.S.P. up to 6 panels
Connection	¼″ B.S.P. Female in gas cock		1″ B.S.P. up to 12 panels

Infra Red Heating by gas has many advantages, and it has a great future. If you would like to know more about its application, or if you would like to see it in action, then get in touch with

DE LA RUE INFRA RED SPACE HEATERS

THOMAS DE LA RUE & CO. LTD., (GAS DIVISION),

Head Office: Imperial House, 84/86 Regent Street, London, W.1. Regent 2901

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S.W. AREA: "The Ferns", Chewton Mendip. Chewton Mendip 224

THE ONE MAN CRANE

WITH A BIG REPUTATION for hard work, the Coles crane has much to offer the gas industry, where the continual handling of materials and the steady plant maintenance work provide full employment for mobile cranes.

Technically unsurpassed, the Coles mobile—either self-propelled, lorry-mounted or rail-borne—is safe and simple to operate, fast and precise with loads. Power is applied to all crane motions through the Coles electric transmission system which ensures instant control and smooth operation at all times. Many safety devices protect both operator and machine against accidents.

The use of Coles cranes can quickly show a real saving in handling costs since only one man is needed to operate any model. This is one of a lot of reasons why there are more Coles in use than any other type. We'd be glad to supply the others on request.

Coles cranes are manufactured with a wide range of lifting capacities up to 20 tons. Also available are "Electric Eel" Industrial Trucks and Tractors and Electric Hoists. May we send you full details, or arrange a no-obligation demonstration for you?

Designed, manufactured and marketed by

STEELS ENGINEERING PRODUCTS LTD.

Public Utilities Department

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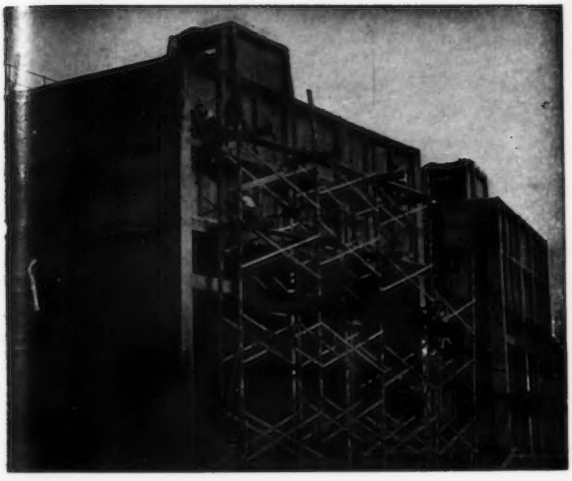

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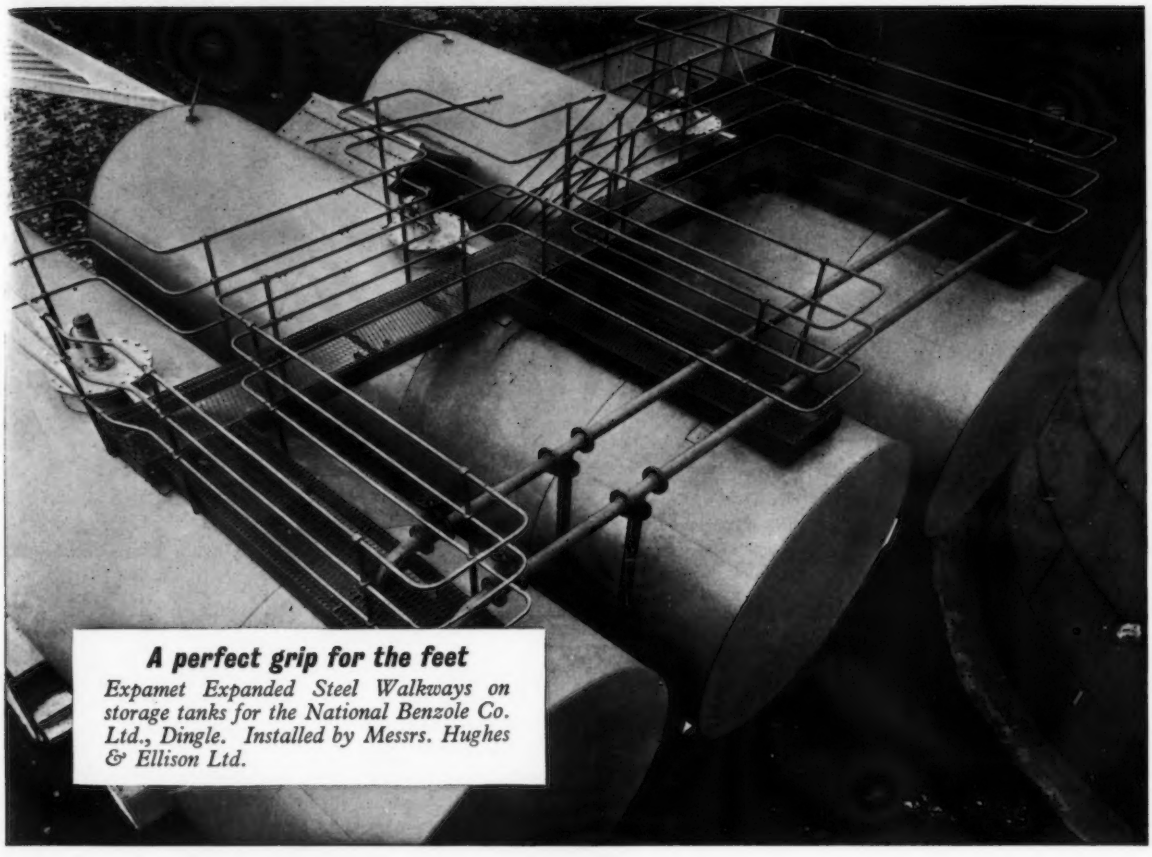

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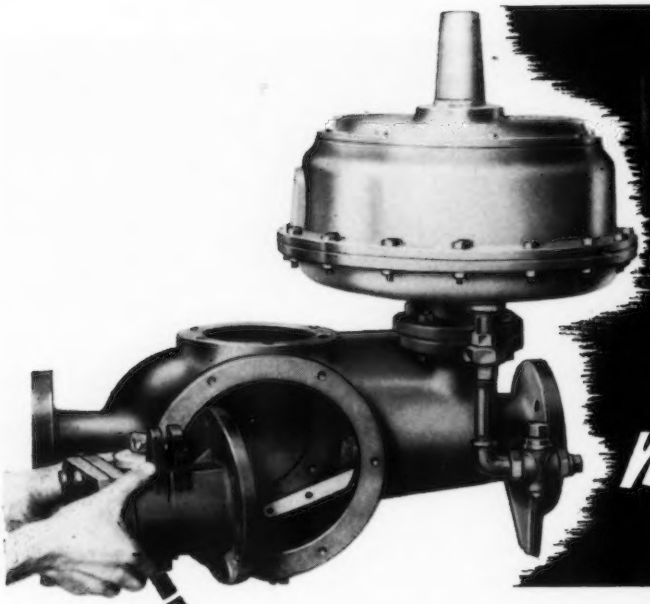

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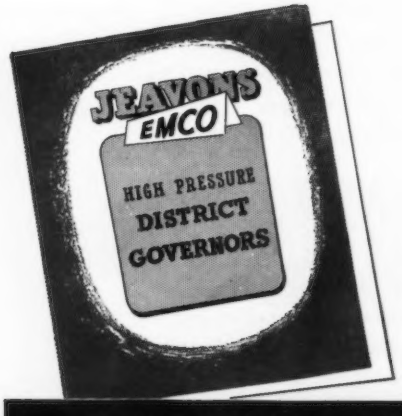

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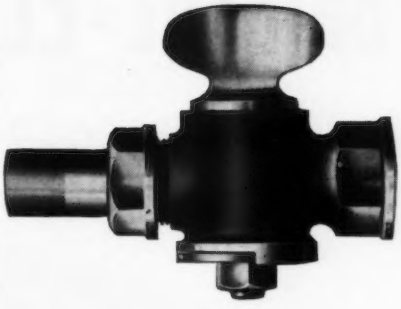

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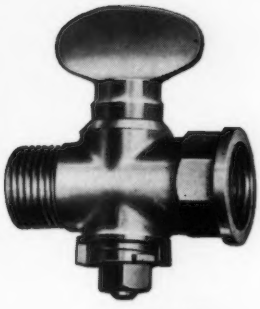

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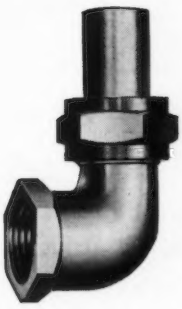

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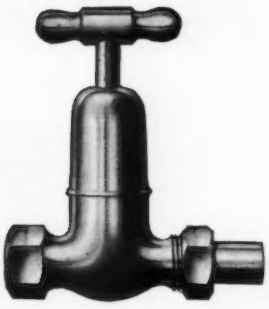

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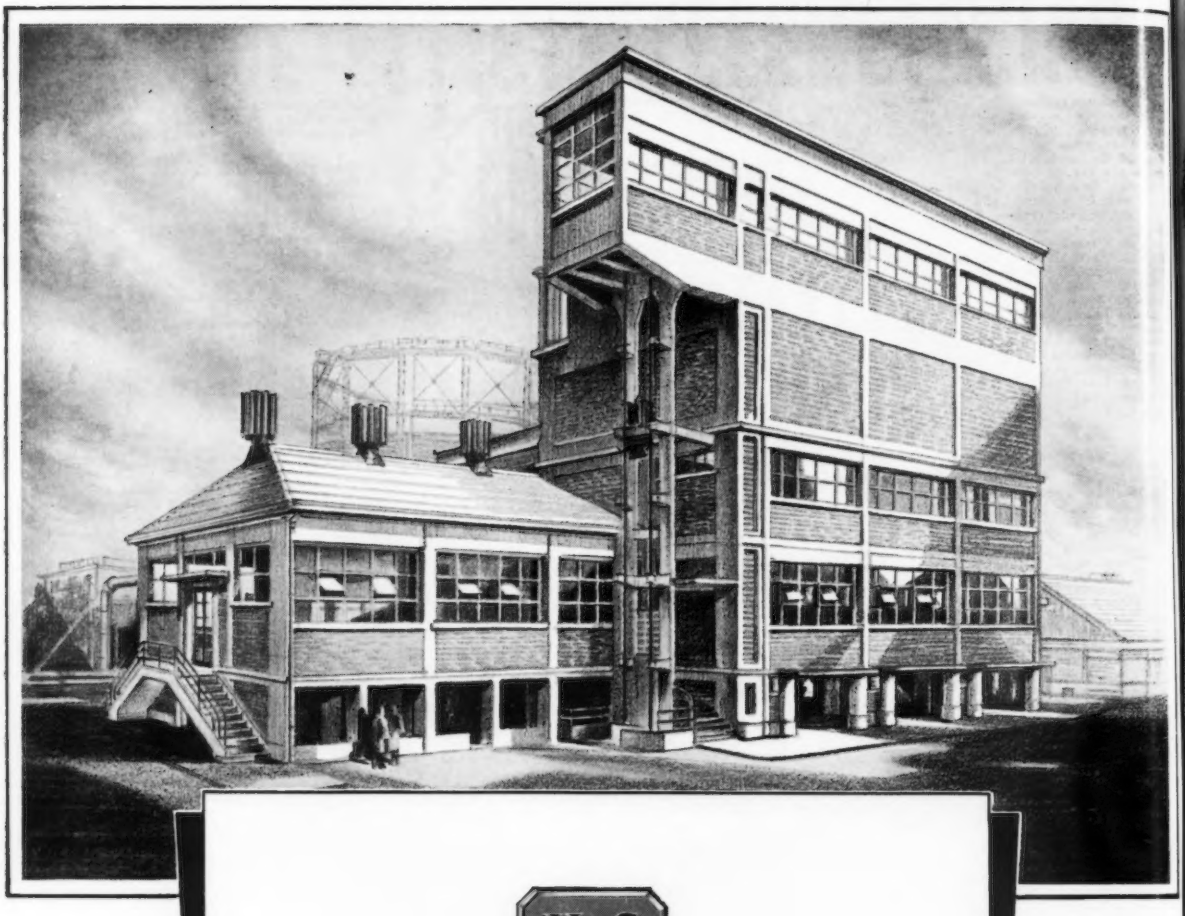

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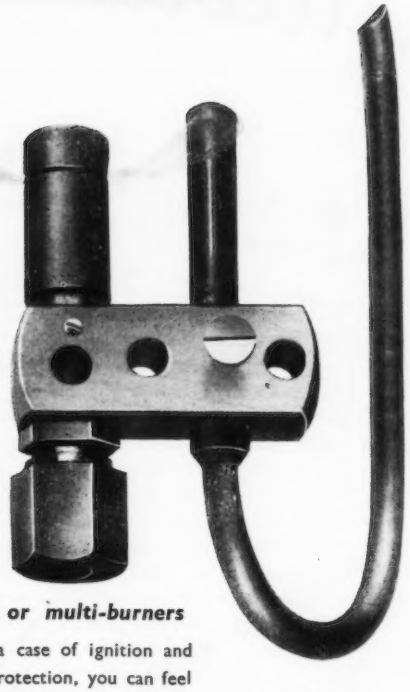

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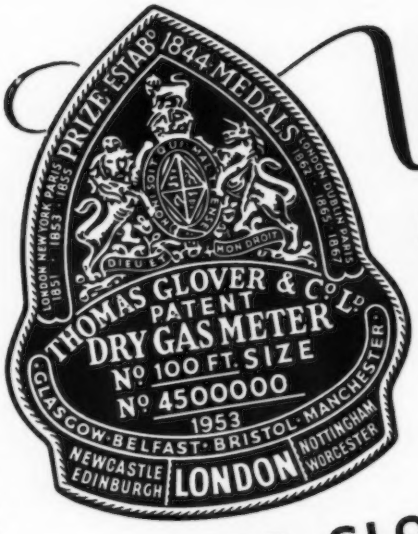

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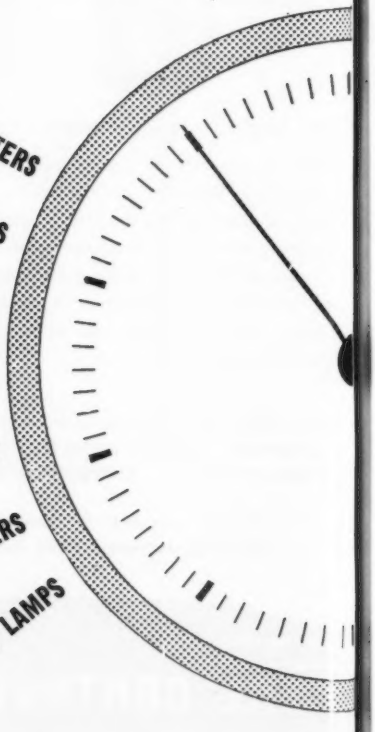

TERMINAL HOUSE, GROSVENOR GARDENS, LONDON, S.W.1

Gas Journal

VOL. 279. No. 4762 106TH YEAR September 8, 1954

'LA THERMIE'

One would have thought that the most important piece of news in the July issue of the 'Journal des Usines à Gaz' was 'the very important circular' addressed to the Prefects on May 18 by the Ministry of Industry and Commerce on the subject of charging for the supply of gas to the consumer on a thermal basis. Apparently our French colleagues did not think it of the very first importance, since it was crowded out of their June issue for lack of space. However that may be, the Ministerial circular is reproduced in full in the July issue. La thermie appears to have been born in 1919—about the same time as the British therm—but she has been in suspended animation ever since, and it does not appear that even now she has quite come to life. The Minister calls the attention of the Prefects to the fact that the recent evolution of techniques in the production of gas and the exploitation of deposits of natural gas has led to public supply of gases of different composition and calorific values—disparities which are increasing. In many cases developments, particularly of the smaller undertakings, have led to the distribution of gases of calorific values greater than that of coal gas.

There is nothing unusual in the argument put forward in favour of pricing gas on the basis of its potential heat content rather than on its volume. The disparity between calorific values of gases offered for sale presents difficulties of a commercial order 'inherent in the psychology of the clientèle'—the consumer does not realise the relation between the quantity of heat placed at his disposal in a given volume of gas and its calorific value. 'It is to be feared that in an increased charge per cubic metre consequent upon an increase in calorific value, he sees only an increase in price.' Under these conditions 'it would appear opportune, before increasing the calorific value of the gas distributed, to change beforehand the method of charging by the substitution for the unit of volume—the cubic metre—the unit of quantity of heat—the *thermie*.'

The latest legal definition of the *thermie* is laid down in Decree No. 48-389 of February 28, 1948. 'The thermie is the quantity of heat necessary to raise by one degree the temperature of a mass of one tonne of a substance whose specific heat is equal to that of water at 15° under the pressure of 1,013 hectopièzes, equivalent to the normal atmospheric pressure'—*i.e.*, at 15°C. and 760 Hg. The decree goes on—'the denomination of grande calorie and of petite calorie' (*i.e.*, kilo-calorie and gram-calorie) 'may be given respectively to the milli-thermie (1/1000 th.) and to the micro-thermie (1/1,000,000 th.).' In round figures, the K. cal. being equal to about 4 B.Th.U., *la thermie* will be equal to nearly 4,000 B.Th.U., and 25 thermies equal to nearly one therm.

But it is not quite so easy as that, because our therm is based on saturated gas at 60°F. and 30 m. Hg., whereas the thermie is to be, theoretically, corrected for humidity and pressure. Practically these corrections are simplified. Humidity is to be assumed at 50% except where the gas is distributed dry. Pressure is to be allowed for on the basis of the normal atmospheric pressure at the works plus the pressure to be maintained at the consumer's meter. The former is standardised in steps of 200 metres (say, 650 ft.) above sea level, and the latter at 80 centipièzes (=80 mm. or about 3 in. water gauge, or say 6 mm. Hg. in the barometer) for all sytems except those distributing pure propane where it is to be 300 cpz (say 22.5 mm. Hg). Thus, to transpose cubic metres to thermies, the formula is: Thermies = $m^3 \times P \times K$, where P is the calorific value (the 'declared value' of the contract) expressed in thermies per cubic metre at 15°C. (not K. cal./m^3 at 0°C.) and K is a constant depending on the corrections. A table of these constants is given in the Decree. For the usual inland town with an altitude not more than 650 ft. above sea level, it is 0.947 for moist gas, 0.955 for dry gas and 0.976 for propane.

Gas supply in France is regulated by contracts (cahiers des charges) between Gaz de France and the several communes served where gas supply is nationalised—there are still a few small places where it is not yet nationalised. Prefects are instructed to watch over the technical clauses of these contracts and particularly the calorific value. On the other hand, in cases when the total of penalties figuring in the contracts in force no longer corresponds with existing economic conditions it would be well, the Minister says, to revalue these conjointly with the setting-up of pricing by thermie.

FABULOUS FOOD

The decision to hold the third British Food Fair at the moment of freedom from food rationing was a happy one, and the mouth-watering visitor can now gaze at the fabulous foods content in the knowledge that nothing save the price stands between him and repletion beyond the dream of kings. Since the war there has been no exhibition so elegant and colourful, so lacking in the more vulgar type of exhibitor, and making so devastating an appeal to man's baser demands. The Gas Council deemed this a worthy opportunity to repeat the International Kitchen, the exhibition of traditional cookery of many lands first held at the Festival Hall in 1952. Although in almost every detail this International Kitchen is similar to the earlier one, it might have been tailor made for Food Fair so effectively does its aim and presentation fit within the general pattern. As before, the individual kitchens serving the various countries are masterpieces of design and their charming occupants exercise their native skill to good effect. After the Festival Hall, Olympia looks barn-like and vast. The kitchens are like delightful models set down in an aircraft hangar. But compared with one day on the South Bank the run of this exhibition (September 7-18) permits an infinitely larger audience and the opportunity to publicise the event has been seized with both hands. For the rest there is electrical insistence on 'time-switch' cookery with various cookery experts ceremoniously 'unsealing' a pre-sealed cooker in which a complete menu had been cooked automatically; there is bull's blood and liquid gold; there is a dazzling display from behind the Iron Curtain. And so we could go on —and will do so in a fully illustrated feature in next week's issue.

TANKER LOADS

Natural gas is, of course, well in the news. In the Middle East, millions and millions of cubic feet of natural gas are daily going to waste. This fuel tragedy—for tragedy it is—makes all the more interesting the American experiment to ship liquefied natural gas from Louisiana up the Mississippi to the industrialised area of Chicago. A correspondent of the *Sunday Times* remarks that, if the test is successful, the next step will be to transport tanker-loads of gas from the deserts of Saudi Arabia and the jungle of Venezuela to other industrial centres of the United States. Venezuela is burning 85% to 90% of the natural gas in her oilfields. If long-distance shipment proves successful, why should not the natural gas of the Middle East become available to British homes and British industries? The tankers now being built for the Mississippi experiment will use part of their gas cargo as fuel. For transport, the gas will, of course, be liquefied.

'NATURAL' AND 'MANUFACTURED'

Production and consumption of natural gas in the United States of America reached an 'all-time high' in 1953. Concurrently with increased demand has been the proving of further sources of supply. At the end of 1953 proved natural gas reserves were computed to represent a 23-year supply at current consumption rates. The American Gas Association has estimated that close on $4,000 mill. will be spent during the next four years, more than 80% of which sum is scheduled for transmission and distribution equipment. Present estimates are that, thanks to the availability of natural gas, 1.2 mill. additional homes will be supplied with gas in each of the next three years. Principal factor contributing to the increase in demand has been the price advantage enjoyed over other forms of heat energy in many parts of the country. But well-head prices are rising—the result, in fact, of growing market demand and higher exploration and development costs. How far these costs will soar remains to be seen; but we are informed that, in areas of the United States far removed from the sources of natural gas, manufactured gas prices are only slightly in excess of natural gas delivered to those areas. As it is, manufactured gas is used principally during periods of peak demand. The fact remains that manufactured gas may eventually put a ceiling on natural gas price levels.

TOWARDS BETTER LAMP POSTS

Between 1,100 and 1,200 members and delegates are expected to attend the annual conference of the Association of Public Lighting Engineers at Eastbourne from September 14 to 17. Not the least important part of the programme will be the exhibition in the Pavilion of street lighting apparatus and equipment, and the display of steel and concrete lamp columns, bollards, and safety signs in the grounds at the rear of the conference hall. In the latter display we may hope to see some continuation of the trend towards better design in lamp standards to which reference was made in the annual report of the Council of Industrial Design. Improved designs for lighting columns continued to be submitted during the past year. At the request of the Ministry of Transport, the Council of Industrial Design accepted as from the beginning of 1952 the responsibility of approving designs of columns and brackets in connection with the Ministry's contribution to local authorities towards the cost of trunk road lighting. Manufacturers readily responded to the Council's request for better designs, and every known column manufacturer is represented on the approved list, which now totals over 300 separate designs. Agreement has been reached between the Ministry of Transport, the Royal Fine Art Commission, and the manufacturers for the gradual withdrawal over a period of five years starting next January of designs originally passed by the Commission but not approved by the Council; thereafter the Council's list will be the only record of approved designs acceptable to the Ministry. The Council is represented on the B.S.I. Committee on concrete lighting columns. Local authorities, architects, local and national amenities societies and others are already using the list for choosing equipment for new lighting installations, and the new designs are gradually appearing in cities, towns and the countryside. Although the change over from gas to electricity for the lighting of main roads is proceeding at an accelerated pace we are still interested in preventing the disfigurement of old streets and country towns with standards of ugly and unsuitable design. And there are many thousands of miles of other than main roads which will continue to be lit by gas for several years. Here, too, pleasing design is not unimportant.

INDUSTRIAL PSYCHOLOGY

Modern industry, with its sometimes repetitive and often tedious work, imposes a severe strain upon the mind and body. Sometimes the strain is too much and the result is absenteeism, slip-shod work and lack of interest. This problem is recognised and tackled in many intelligent ways. The National Institute of Industrial Psychology, for example, is engaging more than half the members of its scientific staff on long-term researches and enquiries of a 'fundamental kind.' Five such projects are stated to be in hand at the moment. They are foremanship research; research into organisation of repetitive tasks; an enquiry into criteria of adjustment to work; another into basic aspects of the learning process in industrial skills; and a group of case-studies in supervision. The first two have been running for some years, the third and fourth are fairly new, and the fifth is still in the first, exploratory stage. At the moment says the Institute in its Winter Bulletin for 1954/5 the foremanship group is trying to develop methods

of measuring the level of success achieved by industrial supervisors. This is clearly a matter of fundamental importance, since, for example, methods of selecting or training foremen can only be validated if it is possible to measure the success of those selected or trained. The 'criteria' research is being carried out by an inter-group committees from the other enquiries, since its field is common to them all. A start has been made on the collection of data on labour turnover, absenteeism, accidents, lateness and labour stability on the one hand, and on indices of productivity on the other. The enquiry into the learning process seems so far to have been confined to an experiment dealing with some 'motivational aspects of training' and the completion of arrangements for fairly large-scale experiment, involving a number of different factories. Still in its embryo stage the newest of these general enquiries is to carry out a series of case-studies, focussing attention particularly upon the position of the supervisor in the management structure. Appealing for offers to discuss the possibility of collaboration in any of the researches, the Institute stresses the necessity for co-operation from industrial and commercial organisations.

Personal

Bratt Colbran, Ltd., announce that MR. FRANK DAVIES has been appointed Gas Sales Manager to the Company.

Radiation Group Sales, Ltd., announce that MR. R. H. LEWIS has been appointed Manager for the Eastern Gas Board area.

MR. FRED ARCHDALE and MR. WILL ARCHDALE have been elected to the Board of the Staveley Coal and Iron Co., Ltd.

MR. D. MCDONALD, Chairman of the Executive Committee of the Board of Johnson, Matthey & Co., Ltd., since 1950, has retired after 44 years' service with the Company.

MR. W. A. HARTOP, Works Director of George Kent, Ltd., is leaving England on September 9 for a two-month stay with the Kent subsidiary in Canada, Kent-Norlantic, Ltd., Horner Avenue, Toronto. The main object of his visit is to assist the production organisation of Kent-Norlantic towards full operation and also to investigate further valuable export prospects for George Kent products. He will be visiting Kent-Norlantic agencies in various provinces, covering the whole of Canada to the Pacific seaboard.

Increased refining costs have resulted in increases in the price of pure and 90's benzole as from the first of this month. Examples of the increases are: a bulk minimum lot of 200 gall. pure benzole, 5s. 4d.; the same lot of 90's benzole. 5s.

Obituary

MR. CHARLES W. CLUBLEY, B.E.M., who was for 34 years, until he retired in 1951, works foreman at Spalding gasworks, has died at the age of 68. He was engaged in the gas industry for 51 years altogether and for his services he received the B.E.M. in 1951.

What was described as the secret of better, lighter, and perfectly textured cakes was told to members of the Ramsgate and District Branch of the Women's Gas Federation, at a recent meeting. Members of the Branch watched a cookery demonstration given by Miss Eileen Evans, cookery adviser for George Borwick and Sons, Ltd., who showed how sponge cakes, tea cakes and pastry could be made from Borwick's packeted mixtures.

Woodall-Duckham Construction Co., Ltd., have received the order for the new coke oven plant to be built at Ravenscraig, near Motherwell, by Colvilles, Ltd., as part of their £20 mill. Scottish steel development scheme. The installation, valued at about £2½ mill., will carbonise 1,600 tons of coal per day and will comprise 70 W-D Becker coke ovens, coal handling, storage and blending plant; coke handling and screening plant; by-products equipment; benzole recovery and rectification plant and water recirculation and cooling equipment.

The National Arbitration Tribunal has upheld the claim of employees of the Armagh Gaslight Co., Ltd., for an increase of 4s. 7d. per week for day workers and an increase of 5s. 10d. per week for shift workers. The award is to have effect as from the beginning of the first full pay period following July 20. The claim was made on behalf of the men by the National Union of General and Municipal Workers.

Elland Works Shut Down After 117 Years

The 117-year-old Elland Gasworks ceased making gas on August 27 and henceforth the undertaking will be supplied from the new works at Tingley, near Wakefield, through the West Yorkshire gas grid. The coal gas plant is to be retained in working order, however, for emergency use, and water gas will still be manufactured there to augment the grid supply during winter.

Half of the 26 workers at Elland have been found alternative jobs at Halifax or Huddersfield Gasworks, and the rest, all with long service, will remain at Elland for distribution work, control of the grid apparatus, making water gas and handling coke supplies.

The Elland-cum-Greetland Gas Company was first formed by local people in 1836, but control passed to the United Kingdom Corporation in 1937 when the Company's ordinary stock was acquired. The first manager of the gasworks was Mr. Robert Dempster, who founded Robert Dempster and Sons, Ltd., Elland.

VISITORS FROM NIGERIA

In traditional costume, this party of Nigerian visitors were received by officials at the North Western Gas Board stand at the Southport Flower show which took place on August 25-27. Left to right in our picture are Mr. G. Hollows, President, Southport Rotary Club; Mr. G. King, Deputy District Service Manager, N.W.G.B., Southport; the Nigerian visitors; Mr. H. Butters, a member of the Board; Mr. H. J. Risby, District Service Manager, Southport; and Mr. Frank Fisher, Sales and Service Officer.

REACHING FOR NEW HORIZONS

FROM AN ADDRESS TO THE 47TH ANNUAL MEETING OF THE CANADIAN GAS ASSOCIATION, JUNE 20-24, 1954, BY

EARL EACKER,

President, American Gas Association; President, Boston Consolidated Gas Company.

In choosing the title of this address I was mindful of the prospects in the Canadian gas industry. The discovery of great new gas reserves and the expectation that these reserves will soon be piped to industrial centres in Canada, it is hoped to some in the United States, pave the way for the expansion of the Canadian gas industry such as could be the envy of the rest of the business world.

The first natural gas supplied to the Detroit area was Canadian gas. Now gas from the United States flows into Canada and in a short time it is possible that the flow may again be reversed. Certainly this points to the close relationship between Canada and the States. I believe both our nations can reap great benefits from an orderly development and mutually satisfactory exchange of our natural resources, as well as exchange of the products of our human resources.

The Canadian gas industry is in a boom period. It has opened up new reserves, added customers, and increased sales. The industry has gained 27% in natural gas production in the three years, 1951-53. What concerns us most is that the immediate future of your industry is as bright as any on this continent. I salute you and your prospects.

Achievement of Unity

Several past presidents of the American Gas Association have worked consistently to co-ordinate all segments of industry into a strong, vital army, capable of promoting all the advantages of the superior fuel we produce. All segments of our industry—producers, transmission companies, manufactured and natural gas utilities, as well as appliance manufacturers, distributors, and dealers—have a common interest. Banded together we can reach for newer and brighter horizons. The present position has not come about because of the words or actions of any one person or any small group of persons. It has been realised because of the work of many individuals. Our various associations are not entities in themselves. Our associations are you and me. Their accomplishments result from the work and studies of individuals—members of our respective company organisations—and the staff who organise, guide, co-ordinate, and document the activities of their respective associations.

Most of the development of this unity has been accomplished through the co-operation of our strong national associations—the American Gas Association, the Canadian Gas Association, the Independent National Gas Association, the Gas Appliance Manufacturers Association—and valued assistance has been forthcoming from regional and State associations.

The American Gas Association has acted as a spearhead of this effort and has been most fortunate in having the help and support of 14 other regional and state associations.

Rapid Development

Each year, for the past several years, the industry in the United States has established new records in the number of customers served. The amount of gas sold has reached a new high level each year. Revenues from the sales of gas now total $2,750 mill. each year and probably will pass $3,000 mill. in 1954. And yet, complacency has been one of our greatest weaknesses.

It is true that we have more than 27 mill. customers, and we are adding nearly a million new customers a year. We take pride in the fact that we are a $13,500 mill. industry—the sixth largest industry on this continent. We can boast of the fact that our natural gas pipeline system now measures some 394 mill. miles. Each year we add thousands more miles of natural gas pipeline to this system.

Competition, however, is severe. The electric manufacturing industry, headed by industrial and advertising giants such as General Electric and Westinghouse, is putting enormous funds and forces into the fight to capture our kitchen load. And, I am sorry to admit that in some areas the gas industry has been doing very little to resist this serious onslaught. The cooking load was the salvation of the gas industry when Mr. Edison and his electric light bulb wrote the obituary of the illuminating business of the gas industry 75 years ago. For many years gas cooking was regarded as the very backbone of the domestic load of the industry. Yet, last year, at one point on the chart of range sales, the ratio of sales of gas ranges compared with electric had dropped 1.2 to 1.

Automatic gas water heating, a service where all of the advantage lies with gas, was losing ground in the new home field. Electric water heaters were being installed in older homes also. Gas clothes dryers, with their greater speed and lower operating cost, were heavily outsold by electric competitors. Even in the field of space heating our competition has increased its promotional emphasis on electric heating. Clothed in the garb of modernity, the heat pump and radiant panel heating are getting publicity far in excess of their relative importance in the heating field.

It is unfortunate, but partly true, that through complacency—or lethargy—or other reasons perhaps beyond our control, we have permitted competition to capture the term 'modern.' It has been used—and is still being used—to imply that our industry and our appliances are antiquated, outmoded, and obsolete.

Testing of Gas Appliances

I am informed that there is a movement in Canada to set up a separate laboratory to test gas appliances. This is understandable, and if it is found to be beneficial to your companies it will have the wholehearted support of the A.G.A. Due to distance involved and customs regulations, Canadian manufacturers sometimes have encountered difficulties in getting their products tested and approved. The American Gas Association recognises this situation; and, in fact, its laboratories supply information to interested parties in Canada on the problems involved in the operation of national testing agencies. As I see it, the major problem is one of volume, and the Canadian gas industry must decide whether or not it is economical and practical to establish a Canadian laboratory.

The problem of adequate standards is of paramount concern to both the Canadian and the American Gas Associations. I believe that we must maintain identical requirements regardless of the laboratories that may enforce them. I have served on the Approval Requirements Committee for many years, and I am convinced that it would be not only unwise but very harmful to the gas industry in both countries if standards for gas appliances varied in either country.

I would like to direct attention briefly to another development which promises to bring us to new horizons—the increased awareness of our responsibility to keep the public adequately informed. The Canadian Gas Association has a committee studying the possibility of setting up a national public relations programme. Likewise, A.G.A. and two other national gas associations in the United States are making concerted efforts to improve the public's understanding of the gas industry. These efforts will be helpful and deserve wholehearted support.

The public information programme of the Independent Natural Gas Association is now in its second year. This programme carries as its central theme the simple statement: 'Production is the key to supply and it is more important to get natural gas at its competitive value than not to get at all.' Teamwork is heavily stressed with the three major elements of the natural gas industry—production, transmission and distribution—working together. Advertisements, radio spots, speech material, employee information, investor pieces, and many other items are used to tell the story of natural gas.

A companion programme sponsored by the Gas Appliance Manufacturers Association strongly emphasises appliance pub-

lic'ty and promotion. Two important fundamentals are involved in the G.A.M.A. campaign. First, the establishment and maintaining of policies to win and hold the goodwill of all important groups—employees, stockholders, customers, dealers, suppliers, and such affiliated groups as federal, state, and local governments, communities, and the public at large. Second, the programme employs every possible opinion-forming medium to explain the policies and operation of the gas appliance industry to public groups. All this is being done by the Gas Appliance Manufacturers Association on a national scale. In addition, the public relations programme is providing effective assistance in combating harmful legislation.

To round out the gas industry's programme, the American Gas Association this year expanded its public relations activities. These activities are specifically designed for maximum use by individual companies at the local level. Close co-ordination is being effected among all these public relations programmes of the gas industry. The Association is building up a storehouse of public relations tools and information for distribution to member companies through periodic bulletins and personal contacts. The flow of basic industry information to gas companies also is being expanded. We feel that the maximum results can be obtained by making the national association an 'ammunition supply base' which approaches the public directly only to refute mis-statements of fact, or when special situations require. Otherwise, the local approach will be employed in the A.G.A. programme.

A Joint Effort

Another important development is one of the first complete 'packaged' customer relations training programme for utilities. This work was produced after years of joint effort by the American Gas Association and the Edison Electric Institute, working through committees in the respective accounting sections of the associations. These two national utility organisations also are pooling their efforts in several other fields in which they are not competitive.

The future ahead of the gas industry in your territories and in mine is limited only by our own perspective. Our objectives are subject only to the amount of effort each of us is willing to exert to achieve those objectives. We can reach our new horizons—but in reaching them we have a tremendous job to do.

GAS SUPPLY IN CANADA

CHANGING ROLE OF THE CANADIAN GAS ASSOCIATION

'The Canadian Gas Association and the American Gas Association will always be closely associated, but it is impractical, unsound, and unfair to both if the C.G.A. relies on the A.G.A. to act for it.'

The foregoing was expressed by Dr. D. K. Yorath in his Presidential Address to the C.G.A. at the annual meeting last June. The Association, he went on, had till recently been a 'cosy little group of friends, drawn together through business connections, who met once a year on a more or less social basis and exchanged a few ideas concerning their industry.' Today the situation had changed. The C.G.A. had to become a business organisation prepared to get out and do a job on behalf of what was about to become one of Canada's major industries.

Some might regret the change. But they had to be realistic and convert their organisation into a full-time, efficient body that could assist, advise, and act on behalf of, the Canadian gas industry. The only alternative would be to rely on the American Gas Association, and that would certainly be both unsound and unfair. The two organisations would always be closely associated; but, if for no other reason that Governments and legislations were very different, the Canadian gas industry must speak for itself—and with one voice.

A Gigantic Project

The President continued: The theme of this meeting is 'Natural Gas for All Canada'; and in that theme we are not forgetting certain sections of the United States which we hope to supply. I often think that the Canadian people have little conception of the impact that this gigantic project will have on their daily lives and on the country's economy. They are impressed with the $300 mill. suggested as being required to finance the transmission line to Eastern Canada, and with the $135 mill. or so required for the west coast. I doubt if they have considered the other hundreds of millions needed to build provincial trunk lines, gathering systems, distribution systems, interior piping, appliances, meters, regulators, and other equipment. Those millions are not going to be invested unless the gas can be sold. All of us in this industry have a vital interest in seeing that it is sold. It will be the job of the producers, the pipe line companies, the utilities, and the manufacturers to educate and pre-sell the Canadian people on this new boon to their comfort.

They have to be told, and shown from past experience and statistics, that natural gas is a safe fuel; and this is a national task that can best be co-ordinated through a national Association such as ours. I agree that local public relations are the concern of the local utility, but I also think they are the grass-roots approach to an overall public relations programme. I believe it is essential that such local programmes be supported by an overall public relations or public information programme on a national scale. This should be a continuous matter, even in countries or areas where gas has long been in general use. In a country which is just on the threshold of such a national development, it is vital if development is to succeed.

Co-ordination the Keynote

Those interested in producing, processing, gathering, transmitting, distributing, and selling this gas and the appliances which use it should ask the new executive to study the problem. They should be requested to appoint a committee or prepare a report of their own making recommendations, advise how the Canadian Gas Association can serve effectively, and how such a programme can be financed. With full support and through co-operation the Association could produce results no one company or group could achieve by itself.

We are going to take natural gas across this country from the Pacific Ocean to the St. Lawrence River—a project more vast than has faced any industry in this country's history. Let us combine and co-ordinate our forces and our talents so that we may give our people the type of job and service they expect from Canadian capital.

OUTLOOK IN WESTERN CANADA

An outline of the gas supply situation in Western Canada was given by Mr. Ralph E. Davis, a geologist, of Houston, Texas, at the annual meeting of the Canadian Gas Association.

The author said that, after an exhaustive review of evidence presented last year, the Alberta Petroleum and Natural Gas Conservation Board found a total of about 11,500,000 mill. cu.ft. of natural gas proved and available. After assigning 6,400,000 mill. cu.ft. as a suitable reserve to cover Alberta requirements for 30 years, there was an excess of 5,100,000 mill. cu.ft. But the foregoing figures, he said, have been substantially increased by the Board this year, possibly by nearly 2,000,000 millions. Important gas supplies have been discovered and are under development in the British Columbia portion of the Peace River country, and the gas found to date in Saskatchewan is important in meeting certain local market requirements.

Approval of gas exports from Alberta has been given for these amounts: To Montana Power Company, 334,000 mill. cu.ft.; to West Coast, 210,000 mill. cu.ft.; and to Trans-Canada, 4,280,000 mill. cu.ft.

Proved and available gas reserves, brought to their present magnitude largely during the past two or three years, are impressive. It must be remembered that this gas is widely distributed in a very large area, and at a great distance from markets sufficient to support the proposed transmission enterprises. This brings difficulties into the picture which are not too easy to meet. The longer the transmission distance, the longer must be the life of the enterprise. A 1,500-mile line has generally required at least a 20-year supply. A 2,500-mile project may require, other factors being similar, a 30 to 40

year life. If the Western Canada natural gas province is to become vitally important in the natural gas economy of Canada, it must be based upon suitable gas supplies good for from 30 to 50 years. And this will require reserves yet to be proved by the drill.

Potential of Unexplored Territory

However, it is logical to believe that important discoveries comparable to those already made remain to be found.

After speaking briefly of the major units of the stratigraphic column in the south part of the Western Canada Sedimentary Basin and the gas prospects therein, Mr. Davis commented: 'All in all, I believe that the gas to be discovered and developed in the western provinces will be of great importance, and from the standpoint of foreseeable gas requirements there will be no question as to the supply for many years to come. The foundation of my belief lies not merely upon the quantity of gas which can now be labelled as proved, but largely upon the highly prospective unexplored areas of this vast region.'

The President of Trans-Canada Pipe Lines, Mr. N. E. Tanner, explained to the Association the steps which will have to be taken to put Alberta in a position to export gas. He discussed the building of the Niagara line to serve Toronto with United States gas until Western Canada gas becomes available. Delivery, he said, will be made to customers in the Toronto area not later than November, 1954. People in the area, he added, are becoming more gas-minded. The engineers of Trans-Canada Pipe Lines estimate that there will be a large demand in the district covered by the Consumers' Gas Company. Discussions are taking place with the Union Gas Company; and if the programme goes according to schedule it will be possible to supply gas to other areas in the east in advance of the gas going east from Alberta, thereby building-up larger markets and providing storage which will prove very helpful.

A NATIONAL TESTING LABORATORY

In 1927 the Canadian Gas Association adopted the 'Approval Requirements and Testing Procedures' for gas appliances sponsored by the American Gas Association and now generally recognised throughout Canada and the United States. These requirements constitute a voluntary minimum standard to provide consumers with safe gas appliances and accessories, of substantial and durable construction, which will give satisfactory performance when properly installed. The Canadian Gas Association issues a certificate of approval on gas appliances which have met the requirements, and such appliances are identified by the C.G.A. Seal of Approval. About 100 leading Canadian and U.S. manufacturers of gas appliances are now authorised to use the C.G.A. Seal, and the number is increasing rapidly.

For several years, however, Canadian manufacturers of gas appliances have felt the need and desirability of having authorised testing facilities in Canada which would cover Canadian-made appliances to the C.G.A. Standard. To date, all testing has been carried out at the laboratories of the American Gas Association at Cleveland, Ohio, and Los Angeles, California. These laboratories have offered co-operation in the setting-up of a Canadian laboratory if this should prove economically feasible.

During the past three years much study has been given to the possibilities of a testing laboratory in Canada, and considerable progress has been made. In 1952 the Executive Committee of the C.G.A. discussed the problem. At that time a Standing Committee was appointed consisting of representatives of gas undertakings and appliance manufacturers. This Committee investigated the facilities of both the Canadian Standards Association and the Ontario Research Foundation; and it was decided that the latter would be the most suitable testing authority. The identity of the C.G.A. would not be lost, and the Foundation would act as the agent of the Association. The Foundation, moreover, has effective agreements with the British Columbia Research Council, the Alberta Research Council, and the National Research Council.

In March, 1954, detailed arrangements were investigated, and it was confirmed that the B.C. Research Council and the Alberta Research Council were prepared to co-operate in the scheme. Further discussions are taking place and high hopes are entertained

Stress Relieving—A Problem Solved by Gas

Recently an interesting industrial problem faced the East Midlands Gas Board. The problem was the stress relieving of a centre weld of a high pressure oil fractionating column 120 ft. long and 3 ft. 8 in. in diameter. The column had been initially fabricated in two 60 ft. sections, each section being separately stress-relieved in a furnace. The two sections were then aligned for the final central weld at the works of a local chemical engineering firm. As there was no available furnace large enough to take the whole of the completed column, it was agreed that if this final weld was stress-relieved on site to a pre-determined heat treatment specification, the column would be accepted by the oil company's inspecting engineer. This called for a temporary furnace setting local to the weld. How the requirements were met is described in Report No. 566/53 of the Industrial Gas Development Committee of the Gas Council.

The necessary conditions were followed as laid down in a Code of Practice issued by the American Petroleum Institute and the American Society of Mechanical Engineers. Briefly stated they comprised: (a) The temperature gradient on either side of the furnace and along the heated portion of the shell not to exceed 200°F. per foot; (b) the temperature difference throughout the portion of the shell being heated not to exceed 150°F.; (c) the rate of heating above 600°F. not to exceed 400°F. per hour; (d) a temperature of 1,100°F. to be attained and maintained for one hour; (e) the rate of cooling not to exceed 500°F. per hour.

Furnace Design

A brickwork duct was built around the lower half of the vessel, the construction being such that a rectangular combustion chamber was formed with an offtake into the duct, and a flue arranged at low level to relieve any excess pressure in the furnace. The upper half consisted of a sheet-steel duct which rested on, and was sealed to, the lower brickwork. This duct was then covered with brickwork to form the finished structure.

With a view to maintaining the required temperature gradient along the column, a ring of low temperature insulating bricks 3-in. thick was placed against the interior surface for a total length of about 6 ft., and a spillage of hot gases from the heating chamber was allowed to flow along the exterior surface of the vessel for a distance of some 2 ft. on each side of the main chamber in an annulus created by the fitting of lagged sheet-steel covers held away from the shell by ¼-in. distance pieces.

The portion to be heated was a circumferential strip 15-in. wide, and in the method adopted the hot gases were drawn from the top of the combustion chamber into the inlet side of a high-speed axial-type fan and circulated at high velocity around the annular space between the exposed shell surface and the ducting. It was essential in this design to have the fan blades and a portion of the shaft in the flow of the hot-gas stream. To avoid any possibility of overheating the independent fractional-horse-power motor, it was proposed to employ a vee-rope drive and to water-cool the hollow fan shaft and the shaft bearings. In practice, however, the fan shaft was solid and driven direct by a motor through insulated couplings. This was not entirely satisfactory, as the conducted heat affected both the bearings and the motor during the course of the tests.

Burner Equipment

The burner equipment consisted of two 'Hypact' burners, Nos. 600 and 400, each separately controlled by a quadrant cock and fed from a common gas-supply pipe which carried the control equipment. The gas was fed to the burners through a constant-pressure governor and a solenoid valve, the latter being by-passed with a small valve in the by-pass pipe for adjustment purposes. The solenoid valve was operated from the electricity mains through a temperature indicator-controller, and the controlling thermo-couple was sited in the hot-gas stream at its first point of contact with the vessel. Arrangements were made for the recording of temperature.

As rapid heating was not essential, it was decided to avoid any possible local strains due to expansion by bringing up the temperature slowly. This was done by running the No. 400 burner until the temperature rise commenced to slow down, then changing over to the No. 600 burner, and finally running both burners full-on against control by operation of the solenoid valve from the temperature controller. The whole cycle was carried out to the satisfaction of the inspecting engineer, and the completed column was accepted by him.

The gas consumption over the total heating cycle was approximately 20,000 cu. ft. (100 therms). This was considered to be reasonable in view of the size of the vessel and the nature of the heat treatment involved.

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Developed from the pioneer work of the Birmingham Gas Department the Spray Welding Process enables the walls of gas making plants to be repaired whilst they are *hot*.

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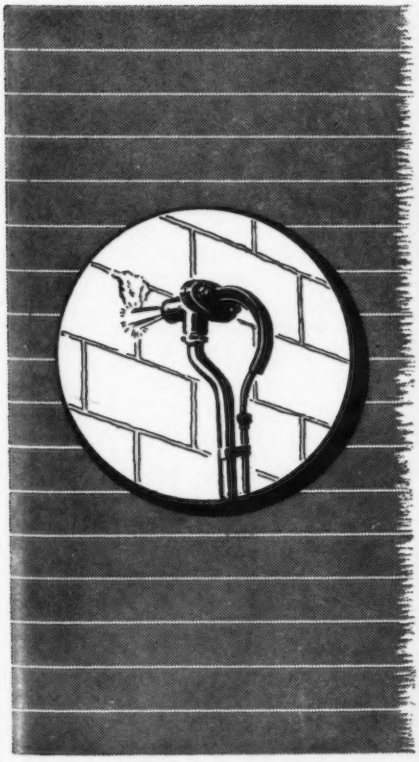
Both the extent and the location of the weld are controlled by the operator. Holes can be filled, joints closed and eroded areas built up.



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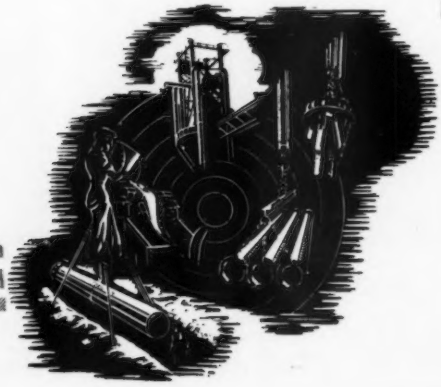
Easy connection of service pipes

The connection of service pipes to the parent main is an essential part of the work in completing any distribution system. The close grain of Stanton spun iron, with its freedom from blow-holes and irregularities, ensures efficient drilling and tapping of the pipe. In consequence the service fitting, screwed directly into the main, gives a leaktight connection which has ample strength to resist any localised stresses which may be imposed on it in service.



THE STANTON IRONWORKS COMPANY LIMITED Nr. NOTTINGHAM

PARKRAY . . . *a new approach to heating*

The search for 100% efficiency in solid fuel continues, and it is still the Ridley report which points the way. The imperative need to economise in the use of coal—practically Britain's only indigenous fuel—has to be reconciled with a widespread determination to improve standards of domestic comfort, and the fact that nearly one-third of the coal mined in this country is used domestically, either as solid fuel or in the form of gas and electricity. Studying this problem, the Ridley Committee came to the conclusion that no fuel or combination of fuels can be selected as the 'best' for domestic requirements in all cases, but reported: 'We do, however, agree with the present policy that the main room-heating and winter water-heating services in new houses should normally be provided by solid fuel burnt in efficient appliances because it seems probable that in the majority of cases this will give the service required at the lowest real costs.'

As a nation we are addicted to the open fire and, in the absence of compulsion, solid fuel will continue to be burnt that way.

Existing types of open fire appliances for space and water heating have reached a stage of development which offers little scope for the measure of improvement required to meet the Ridley Committee requirements. Only a radical change of approach could produce the long step forward required by the Committee's findings. Recognising this, the Radiation Research Centre developed the 'Parkray' free-standing convector fires, which formed the subject of a small but elegant exhibition at the Building Centre last week.

Performance Figures

Well-tested claims made for the 'Parkrays' suggest that they should be in the forefront of the battle against fuel waste and smog created in the home, and the following figures, based on performance, show the type of performance of which they are capable.

The average pre-war open fire was 23% efficient, and the improved post-war open fire is approximately 28% efficient; it is claimed that the 'Parkray 1' raises efficiency to about 40%; the 'Parkray 2,' to 50%, well in excess of openable stoves. Meanwhile the amount of coal burned in one hour for equivalent room heating decreased from 3.5 lb. in a pre-war fire, to 3.2 lb. in the first post-war improved models, down to 2.4 lb. in an openable stove, and, lowest of all, 2.3 lb. in a 'Parkray 1.' The 'Parkray 2,' providing all hot water needs, only raises consumption to 2.7 lb.

In the topical matter of smoke reduction, compared with pre-war fires, the first post-war open fires were 5% more efficient, the first convector fires 14%, the openable stove 15%, the 'Parkray 1' 17%, and the smoke-consuming 'Parkray 2' 80% better. And this impressive performance can be got on nutty slack!

Radiation's experts point out that complete elimination of smoke may never be attained with an open fire burning coal. Good quality coke and other smokeless fuels account for about 10% of domestic solid fuels. Until a higher proportion of smokeless fuels become available, it would appear that regulations to extend smokeless zones might be modified to allow smoke-reducing open fires to burn bituminous coal. This would reduce smoke more quickly than by waiting for more smokeless fuel. Then, when smokeless fuels are fully available, the 'Parkray' type of fire will burn them with complete efficiency, with no need to replace or alter the appliances.

Two models have been mentioned. The 'Parkray 1' is a continuous burning convector fire providing radiant heat and convected warm air for space heating in the room in which it is installed, at low fuel consumption. This fire can either be installed freestanding in a prepared recess, or in an existing fireplace opening with a 'Milner' or similar type back brick.

It has an adjustable throat restrictor which reduces, by approximately three-quarters, the heated air normally lost up the flue of a conventional open fire; in this way room draughts are reduced to a minimum and the general overall room temperature is more easily maintained. The throat restrictor is removable for flue cleaning.

The 'Parkray 2' is a freestanding, continuous burning convector fire, but with a boiler. It will provide radiant heat and convected warm air for space heating and hot water for the average household and heat a small radiator or towel rail. It can also be installed with or without a recess in a kitchen/living room for space heating and to function as a small domestic boiler.

This is a new type of down-draught convector fire. Smoke, that in an ordinary fire passes up the chimney, is drawn down through the fuel bed. Pre-heated secondary air is introduced to improve combustion and to ensure that a large proportion of the smoke is consumed. Convected warm air from around the body of the appliance and direct radiation heats the room.

An adjustable throat restrictor reduces by approximately three-quarters the heated air normally lost up the flue of a conventional open fire; in this way draughts are minimised and room temperatures are more easily maintained because of the reduction in the amount of warm air that passes from the room into the chimney.

The 'Parkray 2' in one of the attractive settings.

The only fixing required is by Rawlplugs attachment to the hearth and connections to the flue. When installed in a recess, connection to the flue is simplified by a new type of sealing ring which enables an effective seal to be made between the flue adaptor and the lintel. Where the fire is to be installed in a 'Milner' type back brick a specially designed soffit plate is supplied for sealing into the flue opening.

A built-in burner is provided for gas ignition, a deepening bar is provided to increase fuel capacity, particularly with coke burning, and an overnight burning plate can be supplied to increase the fire-box capacity.

It is suitable for heating rooms up to 1,800 cu.ft. Egerton insulation standard, of 1,500 cu.ft. traditional. Minimum rate of burning is ½ lb. per hour.

The specially designed fire grate ensures easy ash clearance into the ashpan without disturbing the fire. It makes it possible to remove stones and slate while the fire is alight, the shaker being operated externally.

In most other respects it is similar to the 'Parkray 1.' Space heating for rooms up to 2,700 cu.ft. Egerton insulation, or 2,000 cu.ft. traditional, can be achieved.

Of particular interest at the exhibition, which showed these appliances in various contemporary settings provided by Heals with Bratt Colbran fireplace surrounds, was the first model of the 'Parkray 3,' which is similar to the 'Parkray 2' but without a boiler. It is now under test, and this was its first public appearance.

D

CATHODIC PROTECTION*

A modern application of Metal Rectifiers for the Prevention of Corrosion of Buried and Submerged Metal Structures.

By J. BUSHNELL, Chief Engineer, Crypton Equipment Ltd.

The corrosion of buried metal structures such as pipe lines, and tanks or submerged structures as piers, jetties, floating docks, etc., is a natural phenomenon. Entire dependence on the use of various types of protective coatings has not eliminated the corrosion of structures and the need of replacement. It has been estimated that the cost of replacing corroded buried piping in the United Kingdom alone amounts to over £5 mill. annually.

In all cases where a failure takes place in the coating of a buried metal structure such as a pipe line, contact is established between the metal and the soil. The soil contains oxygen, water and soluble salt which establishes different electrode potentials at the areas of exposed metal. At the points of highest electrode potential, metal ions leave the exposed metal surface and cause pitting or corrosion; this point is regarded as the 'anodic area.' A positive electric current flows from this anodic area through the soil or water to a second area of exposed metal caused by coating failure and the current enters the metal at the second point and provides a degree of protection; the second point is regarded as the 'cathodic area.' A flow of electrons takes place from the anodic to the cathodic areas through the pipe material and a balance of the electrical system is thereby obtained. This current flow neutralises hydrogen ions which are deposited at the cathode at the same time as the metal ions leave the metal at the anode.

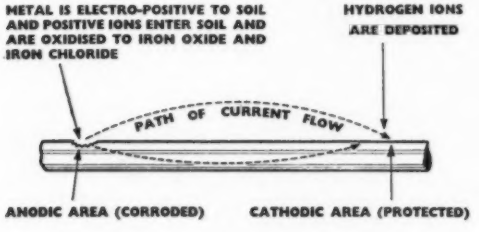

METAL IS ELECTRO-POSITIVE TO SOIL AND POSITIVE IONS ENTER SOIL AND ARE OXIDISED TO IRON OXIDE AND IRON CHLORIDE
HYDROGEN IONS ARE DEPOSITED
PATH OF CURRENT FLOW
ANODIC AREA (CORRODED)
CATHODIC AREA (PROTECTED)

FIGURE 1

Fig. 1 illustrates the flow of current between two defective points, anodic and cathodic respectively, in a buried pipe.

In addition to the corrosion caused by the foregoing in buried metal structures, it may also be due to the electrolytic E.M.F. of two different metals immersed in electrolyte. The metal with the higher potential is anodic in respect of the metal with lower potential, and for the reasons previously explained will corrode. Another cause of corrosion is stray direct currents flowing in the ground in town areas. Current may enter a poorly coated pipe at one point, providing a

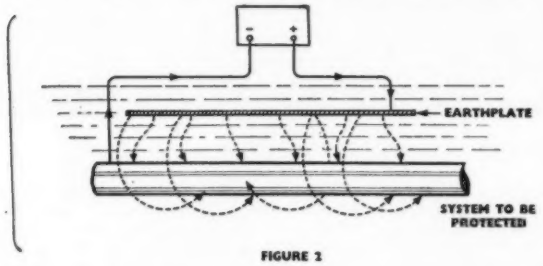
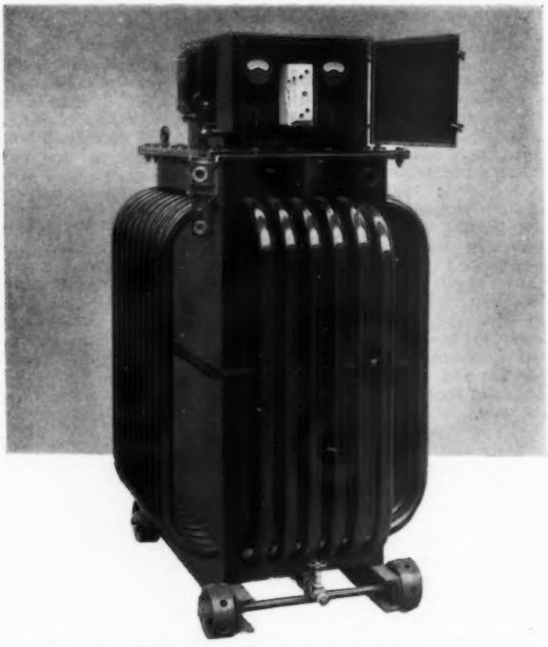


FIGURE 2

degree of cathodic protection; but where the current leaves the pipe again at some other point, corrosion may result.

As previously stated, hydrogen ions are formed at cathodic areas where the current enters the structure, and the area of surface is said to be polarised. A film of hydrogen results which raises the electrical resistance of the electrolytic circuit established, reduces the current flow and cuts down corrosion at the points where current leaves the metal at the anodic areas. Under certain conditions of waterlogging, chemical conditions arise which may remove the hydrogen film normally deposited, thus increasing the flow of current and the degree of corrosion.

The corrosion reactions which take place in buried or submerged metals are very complex and the above remarks should accordingly be accepted as a general guide only.



Crypton Metal Rectifier for Cathodic Protection.

Corrosion is due to the fact that certain areas of the structure are anodic with metal ions leaving the area and causing the corrosion, the current flowing to other areas where the ions enter the structure and provide a degree of protection.

If the whole structure is made sufficiently cathodic by passing current from an external anode, metal ions cannot leave the surface and the entire structure is thereby protected. The current flow is in the opposite direction to the flow of the natural corrosion current and is as illustrated in Fig. 2.

The direct current needed to provide cathodic protection in this manner is obtained in two ways (1) by coupling the structure to a metal of higher electrode potential which can be easily replaced, and (2) by a source of power which delivers current to the structure. In the first method current flows from the structure to the metal of higher electrode potential which corrodes and is replaced from time to time. This method is called the 'sacrificial anode method.'

In the case of direct power supply to the buried structure, metal rectifiers are generally used and are connected to a ferrous metal or graphite buried anode. This method provides complete protection for a bare buried metal structure, but is not normally used in view of the large direct current supply required. It is usual to protect the structure by suitable coating and then use D.C. power to prevent corrosion due to failures in the coating. Thus, by the use of a direct power supply connected in the reverse direction to the normal electrolytic current flow, corrosion can be made to take place on a buried replaceable anode at a distance from the structure to be protected.

The direct current required for cathodic protection may vary from 5 to 1,000 amp. at 1 to 100 volts, depending upon the equipment to be protected and the conditions of operation. Selenium metal rectifiers with their high efficiency, compact size, and freedom from moving parts are ideal means of D.C. power supply. Either single-phase or three-phase rectifiers can be used according to the capacity required; and air cooling or oil cooling can be provided to suit site conditions. For larger outputs it is usual both in England and in most

* Reprinted from *Electricity in Industry*, the Technical Review of the Lancashire Dynamo Group of Companies.

overseas areas to use oil-cooled, but in other countries including the U.S.A. forced draught cooled rectifiers are preferred in view of restrictions placed on the use of oil immersed equipment.

The voltage and current outputs of the rectifier depend upon site conditions. Generally, means of adjustment must be provided to suit seasonal weather conditions.

If the equipment is installed at an attended site, manual control can be used and tapping switches fitted which provide fine steps of control. For remote and unattended areas it is necessary that the current, once set, shall remain reasonably constant; and many types of circuits, including saturable reactor control, have been devised for this purpose.

In some areas where the protection is adjacent to telephone systems, smoothing of the rectifier output is necessary to prevent interference with the communication system. This can generally be overcome by the use of a smoothing choke in the output of a single-phase rectifier or by use of a three-phase full bridge connected rectifier with a basic output ripple of 4%.

Cathodic protection rectifiers may be used out of doors where they are oil immersed for protection, special care being taken to allow for the maximum ambient temperature conditions. Control switches are generally enclosed behind locked panels to prevent unauthorised operation, since excess current can cause harm to the equipment under protection.

For use in oil pipeline areas where flame risk exists, rectifiers can be designed with all controls immersed in oil and with main control switches of the flame-proof type. For small indoor equipment air-cooled rectifiers are used, both manual and automatic control type, and here again the rating must allow for the existing ambient temperature conditions under full continuous operation.

Crypton Equipment, Ltd., specialise in the manufacture of cathode protection rectifiers which are in operation in all parts of the world. All comprise main double wound transformer full wave rectifier, moving coil D.C. ammeter and voltmeter with incoming and outgoing protective fuses. If the range of voltage required is large (a typical example is 0.5 to 24 volts), an auto-control transformer and rotary tapping switches are provided for manual type rectifiers and give up to 63 points of control.

In the case of automatic equipments the control is generally by hand-adjusted tappings with automatic control which provides a constant current over a limited range of voltage on each tapping. Where smoothing is required, a choke or chokes are fitted in the output line.

Operating efficiency with three-phase rectifiers is 75% to 85% from one-quarter to full load; and this, combined with the long life, freedom from moving parts, ease of operation by unskilled labour and negligible maintenance, has resulted in the acceptance of Crypton selenium rectifiers as an ideal means of economic D.C. power supply for the important application of cathodic protection.

SMOKE FROM OPEN FIRES

By L. L. FOX, Fuel Research Station, Department of Scientific and Industrial Research.

(This paper was published in the August issue of the *Journal of the Institute of Fuel*)

Measurements have been made, for one particular coal, of the smoke in the flue gases from a stool-bottom grate and from a smokeless-fuel grate, each installed with its own fireback. Within the range of the experiments, it was found that with both grates the amount of smoke, expressed as a percentage of the corresponding refuelling charge, was independent of the weight of that charge and of the average burning rate of the fire.

The London fog of December, 1952, stimulated interest in the subject of atmospheric pollution and underlined the fact that there is still too little information about the sources of pollution. There have been various estimates of the fraction of the coal burnt that is emitted as smoke from the domestic open fire. These estimates were reviewed in 1938 by Blackie and Bruckshaw,[1] who carried out experiments using a stool-type hearth-bottom grate and showed that when coals of different types were burnt on it they varied considerably in the amount of smoke they emitted, the values ranging from 0.08% to 2.53% of the weight of coal.

Since World War II many of the older types of open fire have been replaced by modern smokeless-fuel grates, of which probably some 2 or 3 mill. have now been installed; and it may be of interest to describe experiments in which measurements were made of the smoke from a 16-in. smokeless-fuel grate and of that from a 16-in. all-metal, stool-bottom grate, when both were burning one particular coal.

METHOD OF MEASUREMENT

The method used at the Fuel Research Station for measuring the smoke from open fires has been described elsewhere.[2] Briefly, the method consists of continuously recording the optical density of the smoke-laden flue gases and their volume rate of flow; it is based on the fact that this optical density is a function of the mass concentration of the smoke, and it depends on knowing the form of this function. This latter was studied at the Fuel Research Station for the smoke from four diverse coals in a series of gravimetric calibrations, the procedure for which has already been described.[3] It was found for each of the coals that, within the range of densities investigated, the optical density of the smoke-laden flue gases was linearly related to the mass concentration of the smoke, whether this consisted of solid particles, or liquid droplets, or a mixture of both.

TABLE 1

Coal		A (strongly coking)	B (non-coking)	C (moderately coking)
Proximate analysis (air-dried fuel) %	Moisture ..	2.6	5.8	1.6
	Volatile matter ..	35.1	33.3	23.9
	'Fixed' carbon ..	60.4	57.2	71.2
	Ash	1.9	3.7	3.3
Ratio of optical density to mass concentration of the smoke (ratio for Coal A taken as 100)		100	106	99

It is of interest that these gravimetric calibrations did more than demonstrate the existence of a straight-line relationship between mass concentration and optical density. They also threw some light on the question 'does the ratio of optical density to mass concentration depend on the type of coal producing the smoke?' Table 1 refers to the first three calibrations, during which the chimney and grate remained unaltered throughout, and shows that, although the coals differed widely in their properties, the ratio optical density/mass concentration was nearly the same for the smoke from each.

In the last of the gravimetric calibrations the coal was the same as that used for all the experiments described in this paper; the corresponding values of optical density and mass concentration, both corrected to a flue-gas temperature of 60°F., are shown in Fig. 1. The correction was necessary because the temperature in the flue at the level where the optical density was measured differed from that of the gas meter used to measure the volume of the flue gases withdrawn

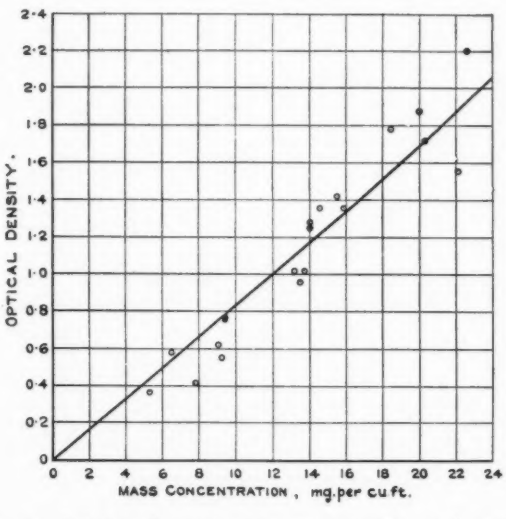


Fig. 1.—Relation between mass concentration and optical density of smoke, both corrected to a temperature of 60°F.

for the determination of mass concentration. Evidently the points in Fig. 1 can be represented by a straight line, so that if L_o = optical density of smoke-laden flue gases, corrected to 60°F.; M_o = mass concentration of smoke, corrected to 60°F.; and K = a constant, we have

$$M_o = KL_o.$$

Now suppose that, at any instant, L = optical density of smoke-laden flue gases at temperature θ_1, V = volume rate of flow of flue gases measured at temperature θ_v, and W = mass rate of smoke emission,

Then
$$W = M_oV\frac{519}{459 + \theta_v} = KL_oV\frac{519}{459 + \theta_v}$$
$$= KL\frac{459 + \theta_1}{519} \cdot V\frac{519}{459 + \theta_v}$$
$$= KLV\frac{459 + \theta_1}{459 + \theta_v}$$

The value of L was recorded by means of a photo-electric smoke-density meter using an optical path length of about 33 in. for the light beam through the smoke, the determination being made as the flue gases passed a point in the chimney approximately 16 ft. above the fire. To measure V, the room containing the fire was made as airtight as its construction allowed and, except for a small leakage of air, all the air entering the room passed through an 8 in. diameter pipe containing a venturi meter, with a throat diameter of 5 in. and linked to a recording micro-manometer. From data obtained in separate leakage tests it was possible to deduce the amount of air that leaked into the room during each experiment; this was less than 4% of the amount flowing through the venturi meter. The total air flow equals the rate of flow into the fireplace opening, and as the majority of this air does not take part in combustion its volume is approximately the same as that of the flue gases. The weight of smoke produced by a given charge of coal was found from the area under the curve obtained by plotting, at intervals of 2½ min., values of W against time for the period throughout which smoke was being emitted by that charge.

It should be emphasised that in what follows no account is taken of the deposition of soot in the chimney, and that whenever a quantity of smoke is quoted it represents the amount that was being borne along by the flue gases after traversing some 14 ft. of 9-in. by 9-in. flue.

GRATES AND FUEL

The modern smokeless-fuel grate incorporated a front firebrick and the primary air control consisted of a bottom-hinged flap opening inwards. The stool-bottom grate was of conventional pattern and its loose fret had an opening of area 2 sq. in. for the entry of primary air. On a second, otherwise identical, front fret this opening was enlarged to 9 sq. in.; experiments were also made with no fret at all.

The smokeless-fuel grate was installed with a sectionalised, 'one-over-three' fireback. Care was taken to form a good seal between the firefront of the grate and the front edges of the side tiles of the fireback, so that air could enter the ashpit only through the primary air control. For the experiments with the stool-bottom grate a one-piece firebrick fireback was used, and whenever a fret was employed this was kept closely pushed in, but there was still some leakage of air into the ashpit around the sides of the fret. The fireback for the smokeless-fuel grate and that for the stool-bottom grate were generally similar in shape to those specified, respectively, for solid smokeless fuel and for bituminous coal in B.S. 1251:1945.

TABLE 2.—PROXIMATE ANALYSIS AND CAKING PROPERTIES OF COAL

Moisture, %	5.8
Volatile matter, %	36.2
'Fixed' carbon, %	56.3
Ash, %	1.7
Volatile matter (dry, ash-free basis), %	39.1
Agglutinating value	8
B.S. Swelling No.	1a
Gray-King coke	Type C

The coal used had a high volatile-matter content but was free-burning, thus ensuring that the results were not influenced by the uncertainties which would have been introduced if

TABLE 3.—SMOKELESS-FUEL GRATE

Position of primary air control	Ignition period: Initial charge of coal, lb.	Ignition period: Amount of gas used, cu. ft.	Ignition period: Smoke, as percentage of coal charged	Refuelling period: Smoke as percentage of coal charged (weight of charge, lb., shown in parentheses) 1st refuel	2nd refuel	3rd refuel	Approximate rate of burning, lb. per hour
Fully open	12	7	1.33	1.34 (8)	1.45 (8)		5.0
	12	7	0.95	1.34 (8)	1.57 (8)	1.66 (8)	6·4
	12	7	1.00	1.36 (8)	1.26 (8)	1.81 (8)	4.9
'Half open'				1.51 (8)	1.41 (6)		5.4
	12	7	>1.16	1.79 (8)	2.01 (6)		4.7
	12	7	>1.07	>1.55 (8)	1.22 (6)	1.19 (6)	4.2
	12	7	>1.07	1.05 (8)	1.12 (6)	1.26 (6)	4.6
	12	7	>1.19	>1.59 (8)	1.14 (6)		4.9
Closed from 30 min. after lighting	12	7	>1.17	1.09 (4)	1.38 (4)		2.1
	12	7	0.71	0.86 (4)	1.59 (4)		2.1
	12	7	>0.88	2.47 (4)	1.29 (4)		2.1

TABLE 4.—STOOL-BOTTOM GRATE

Type of fret	Ignition period: Initial charge of coal, lb.	Ignition period: Amount of gas used, cu. ft.	Ignition period: Smoke, as percentage of coal charged	Refuelling period: Smoke, as percentage of coal charged (weight of charge, lb., shown in parentheses) 1st refuel	2nd refuel	3rd refuel	4th refuel	Approximate rate of burning, lb. per hour
No fret	11	8	0.57	1.28 (6.25)	1.86 (6.75)	1.88 (6.5)		4.0
	11	11	0.98	2.04 (7.0)	1.66 (7.0)	1.75 (5.0)		4.0
	11	7	0.88	1.36 (6.0)	1.91 (6.75)	1.87 (9.25)		4.2
9 sq. in. fret	11	7	1.07	2.11 (6.5)	1.93 (6.5)	1.68 (6.0)	1.90 (5.25)	3.1
	11	9	0.79	2.01 (6.38)	1.97 (6.63)	>2.38 (6.25)		3.5
	11	7	0.61	>2.00 (6.5)	>2.23 (7.0)	2.27 (5.5)		3.3
2 sq. in. fret	11	11	0.54	1.88 (6.0)	1.93 (5.0)			2.5
	11	7	0.59	1.96 (4.75)	1.93 (7.0)	2.04 (5.0)		3.1
	11	7	>1.69	2.37 (4.63)	2.59 (3.5)			3.8

frequent poking had been necessary; in fact the fire was never poked while it was emitting smoke. Table 2 shows the proximate analysis and caking properties of the coal. Before each experiment the coal was graded between 1-in. and 3-in. screens and the moisture content as used was about 8%.

TABLE 5.—STOOL-BOTTOM GRATE: IGNITION WITH WOOD AND PAPER

Type of fret	Smoke as percentage of coal charged (weight of charge, lb., shown in parentheses)
No fret ..	1.62 (11)
9 sq. in. fret	>1.51 (11)
2 sq. in. fret	>2.11 (11)

TEST PROCEDURE

In each experiment the fire was lit with an initial charge of either 11 lb. or 12 lb. of coal, which was allowed to burn untouched until all the smoke from it had been given off, and, except for three experiments, this 'ignition period' was followed by a 'refuelling period,' during which the fire was replenished at least twice. To get an idea of the rate of burning during the refuelling period, the level of the fuel bed after the first refuel was noted and the fire again replenished to that level when all the smoke from the last refuel had ceased.

With the smokeless-fuel grate, the coal was ignited using 7 cu.ft. of gas, of calorific value 530 B.Th.U. per cu.ft. supplied from the built-in gas igniter at a rate of 50 cu.ft. per hour, the ashpit cover being removed while the gas was on. Experiments were carried out with the primary air control fully open all the time, 'half open' all the time, and fully open until 30 min. after the gas was lit, thereafter remaining closed.

In the stool-bottom grate the coal was lit by means of a single-prong independent gas poker which supplied gas at a rate of 28 cu.ft. per hour, the amount of gas used ranging from 7 to 11 cu.ft. Whenever a fret was used it was kept in position throughout the experiment. Three further experiments were made in order to find what effect lighting the fire with wood and paper instead of with gas had on the smoke given off during the ignition period. These three ignition experiments were alike in that each was started with 7 lb. of coal laid on 12 oz. of wood, a further 4 lb. of coal being added 15 minutes later; they differed in that one was with the 2 sq. in. fret, the second with the 9 sq. in. fret, and the third without the fret.

(To be concluded)

ADVISORY COUNCIL FOR CONSUMERS

A Consumer Advisory Council is shortly to be set up by the British Standards Institution to advise industry on consumer needs and to inform the public about the safeguards available in the form of guaranteed standards of quality.

In a statement the Institution says that the Council will consist of 'men and women of standing and experience in the distributive trades, and social sciences, and publicity, with an independent chairman.' Through the various technical committees of the Institution, the Council will be in close touch with 22 national women's organisations, and with industries producing consumer goods. They will be 'equipped to make the inquiries necessary to present those industries with clear statements of consumer needs and wishes.'

A spokesman of the Institution said yesterday that the council will be concerned not only with those goods which already bear the kite mark and the British Standard number—signs that they reach a certain standard of quality or performance voluntarily agreed to by the manufacturer—but with other goods bearing individual makers' guarantees, for example the 'anti-shrink' labelling of some cloths. Scientific investigations of various consumer needs will be undertaken, and the new council will be provided with money to spend on propaganda to the public. Their overriding concern will be to see that shoppers are correctly informed about a product. No doubt one of their first jobs in this field will be to bring about the proper labelling of textiles, at present a matter of some urgency. The names of the chairman and members of the council are to be announced later.

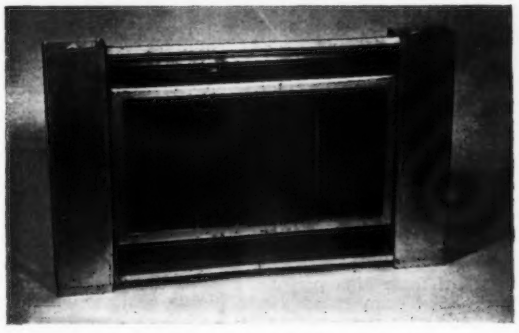
Copies of the discussion and reply on the paper *The Gas Industry in France* (Comm. No. 404), by J. Kec, President, Association Technique de l'Industrie du Gaz en France, are now available from the Institution of Gas Engineers, price 1s. 6d. each, post free.

The 'Rapiradia' Radiant Panel

The current production model of the 'Rapiradia' vertical flat radiant panel (made by Stewart Gill and Co., Ltd., Benlow Works, Silverdale Road, Hayes, Middlesex) has been subject to test by the North Thames Gas Board. Results of the test are published by the Gas Council Gas Development Committee in Report No. 558/53.

The panel is constructed of three principal parts—the panel with flue ducts, a baffle box, and an outer casing. We reproduce a general view of the panel.

There are seven sections of the radiating panel. Each section, 2¼" wide, is coated with 'Rough Stoneclad' having a dark greyish glazed finish on the outer radiating surface and a rough sandy-coloured finish on its inner surface. These sections form one vertical wall of the combustion chamber, the joints between them being sealed with heat-resisting compound. The baffle box is situated behind the radiating panel allowing the products of combustion to rise from the burner, over the inner face of the radiating panel, and thence through openings in the top of the box. From there the products are directed down vertically inside the box and discharged into a flue duct.



The 'Rapiradia' radiant panel.

The burner has 14 No. 118 Bray size S jets fitted so that two fire behind each of the seven sections of the radiating panel. A polished aluminium casing covers the back of the panel.

In the tests, it was assumed that the panels would be installed as a governed appliance and that the normal working temperature of the panel would be 650°F. The heat input to maintain that temperature was determined, and the 20% heat input overload test required by B.S. 717 was based on that heat input.

From the test results obtained the following heat balances have been calculated:—

		Vertical	45° Forward	45° Backward
Heat from radiating panel ..	%	43.8	43.7	48.8
Flue loss	%	23.9	20.8	19.7
Heat from case	%	12.9	18.7	11.2
Cooling air (by diff.) ..	%	19.4	16.8	20.3
Heat radiating from panel ..	%	31.7	31.6	34.8

INCREASED INDUSTRIAL OUTPUT

Industrial production in the United Kingdom in July was 4½% higher than a year ago despite the adverse effect of the start of the main holiday period. The index for all industries (1948=100) for the month was officially estimated at 115-116, compared with 127 in June of this year and 110 in July of last year. So far this year British industrial output has been running about 7% above that on the equivalent period of 1953. This is slightly below the rate of increase established in the first six months of the year, but is equal to the 7% rise achieved in the last quarter of 1953.

Detailed figures for production in June show that the overall output index, at 127, was six points below the May figure but nine points higher than a year before. June output was affected by the Whitsun holiday this year, but it is comparable with June, 1953, when the Coronation holiday also affected output. The mining and quarrying industries' index for June, at 107, was nine points below the May level, but was two points higher than a year before. The manufacturing industries' output was six points lower than in May, at 131, but was 10 points higher than in June, 1953.

WASTE HEAT BOILER DESIGN

Improvements Lead to Higher Efficiencies

The growing use of electricity on gasworks during the last two decades has influenced considerably the design of waste heat boilers. In the first place, steam units were gradually being superseded by electric motors, and additional mechanical handling and general increase in mechanical operation of gasworks plant further increased the demand for electricity. It became apparent that the best use of waste heat steam was for electricity generation, which, however, could not be undertaken efficiently with steam at comparatively low pressure. Considerably higher pressures and temperatures are becoming commonplace in waste heat recovery plants, and with the introduction of high efficiency electricity generation, the operation of induced draught fans by electric motor provides a steady and continuous consumption of electricity with obvious advantage where adequate supply is available.

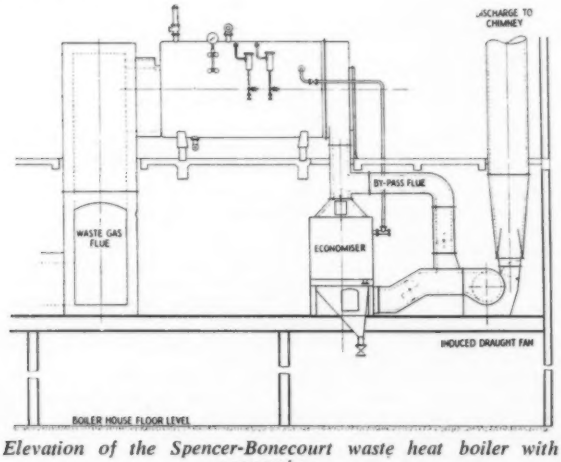
Recent Developments

West's Gas for June, 1954, sketched the history of the waste heat boiler and discussed recent developments. The article in question, from which the following is abstracted, commented that in recent years waste heat boilers of conventional design have been installed for working pressures up to 300 lb. per sq. in. with added superheat up to 200°F. Today working pressures of 250 lb. per sq. in. are commonplace. The design of such boilers follows conventional lines except that heavier scantlings and shell and tube plates are necessary. The heat recovery of these high pressure units is diminished owing to the gas outlet temperature being higher commensurate with the higher steam temperatures at the higher pressures.

The theoretical considerations influencing the choice of steam pressure and temperature were ably outlined in a paper to the Manchester District Junior Association of Gas Engineers by T. Nicklin.

For steam pressures of 300 lb. per sq. in. and over, designs have been developed incorporating extended heating surface in the form of an economiser to heat the incoming water and reduce waste gas outlet temperature to 190° to 200°C. This means that as much as 10% to 15% more heat can be usefully recovered from the waste gases under higher steam pressure conditions. Outlet gas temperatures below the foregoing figures are not recommended in view of the possibility of corrosion troubles on the gas outlet side of the economiser.

The capital cost of the installation is, however, considerably higher than the orthodox design, and it would appear that it is only economic to adopt this design with pressures of 300 lb. and upwards. An installation incorporating this design of boiler is in course of construction at the new gasworks at Denton, and a typical boiler design of the type is shown below.



Elevation of the Spencer-Bonecourt waste heat boiler with economiser.

The thicker plates required in boiler construction to sustain the increased pressure added considerably to the practical difficulties of maintaining tight riveted joints with the longer rivets used. This tended to limit the extent to which high working pressures could be adopted. The development and acceptance of Class 1 fusion welding construction for pressure vessels, however, removed these restrictions permitting much higher boiler pressures to be adopted.

With the continued improvement in welding technique it is reasonable to forecast that reduced manufacturing costs will permit of all-welded construction being adopted in the manufacture of all sizes of boiler drum.

The choice of steam pressure to be adopted will be influenced, of course, by many factors, and higher pressures should not be adopted just because they are now available. Each case obviously should be considered on its own merits.

A considered case was presented in a paper to the South Western Section of the Institution of Gas Engineers by J. Parker, in which he outlined the reasons for selection, after consultation with the boiler makers and steam turbine designers, of a pressure of 250 lb. per sq. in. with total steam temperatures of 600°F.

Some of the factors affecting the choice were stated as:—

(i) The steam conditions of 250 lb. per sq. in. and 600°F. could be reached without fundamental change in the design of the waste heat recovery plant. For working pressures above 250 lb. per sq. in. the boiler makers preferred to reduce the diameter of the boiler shell and to obtain full head by adding an economiser.

(ii) The arrangement of economisers and additional flue gas trunking required 50% more space than the standard waste heat boiler layout.

(iii) Maintenance costs would be higher than for a plant of orthodox design, due to the cost of cleaning economisers and keeping tight joints. Additional fan power would be required.

(iv) A superior category of valves and fittings is required if working pressures exceed the standard demarcation figure of 250 lb. per sq. in., and valve costs are increased by about 18%.

Improvements in Detail

Although the conventional type of waste heat boiler has not changed in principle, there have been many improvements in detail:—(a) Fitting of temperature equaliser (circulator) in the boiler drum for the purpose of raising the boiler water temperatures from cold—*i.e.*, at starting-up periods, before hot gases are passed through the boiler. This ensures even distribution of heat over the boiler shell when the boiler is eventually steaming.

(b) In the design of induced draught fans, resulting in higher efficiences and consequently improved economy in power on the driving unit.

(c) In arrangement and fabrication of waste gas flues to reduce air filtration.

(d) Insulation of waste gas flues to reduce heat losses.

(e) Arrangement of tube 'nesting' in the boiler to give better access for inspection of the tubes externally.

(f) In instrumentation, giving better control and performance.

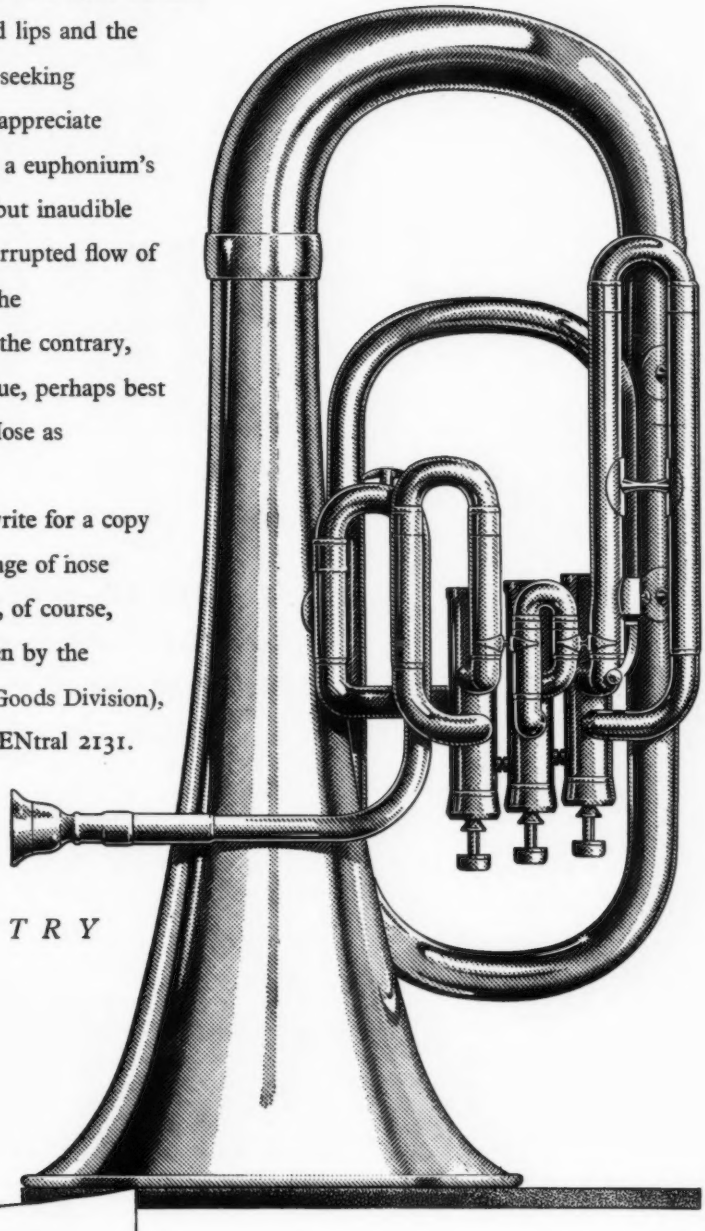
SULPHUR STUDY

A conference to inaugurate the special study of sulphur removal and its recovery from fuel is to be held by the Institute of Fuel on October 6 and 7, at the Institution of Mechanical Engineers, 1, Birdcage Walk, London, S.W.1. Dr. Idris Jones, President of the Institute of Fuel, will be chairman of the first session. In the introduction Dr. A. Parker will deliver a paper on the social and industrial consequences of the presence of sulphur in fuels. Two other first session papers will be concerned with the effect of sulphur in the iron and steel industry. Included in the second session will be two papers on sulphur in town gas and coke oven gas—occurrence and removal. The first will be by Dr. R. H. Griffith and the second by Dr. S. R. Craxford and Dr. A. Parker. The third session on the second day will be devoted to new techniques for removal of sulphur from fuel gases. Papers will be submitted by Dr. H. Schäfer, Dr. J. Bähr, Mr. T. H. Williams and Messrs. A. J. Brockwell and F. F. Rixon. The final session will consist of a paper on sulphur in petroleum, another on requirements of industry and a summary of the conference by Dr. J. G. King.

. . sounding brass

The rich, fruity tone of a euphonium owes nothing to accident. It is achieved by the combination of a wide conical bore, three or four valves, the player's pursed lips and the fact that the air pressure inside is frantically seeking a way out. Even non-musicians will readily appreciate that the uninterrupted passage of air through a euphonium's tube would be not only musically worthless but inaudible as well. In other spheres the smooth, uninterrupted flow of air—or liquid—through tubing is not quite the disadvantage it is in the musical world. On the contrary, engineers, for example, find it a positive virtue, perhaps best epitomised by their preference for Dunlop Hose as the ideal solution to all hose problems.

Those who want to know the score should write for a copy of the brochure wherein is illustrated the range of hose available for every industrial purpose. And, of course, technical assistance is also always gladly given by the Dunlop Rubber Co., Ltd. (General Rubber Goods Division), Cambridge Street, Manchester, 1. Tel.: CENtral 2131.



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NATURAL GAS PRODUCTION AND TRANSMISSION

Institute of Gas Technology Home Study Course

In January of this year the Gas Council began its search for natural gas in Great Britain—the beginning of its £1 mill. project spread over five years. The prospecting work is being carried out on behalf of the Council by the D'Arcy Exploration Company, subsidiary of the Anglo-Iranian Oil Company. Interest in the project was given a great fillip last June when it was made known that natural gas had been found at Crowborough, Sussex, where the drilling is planned to go down to a depth of about 2,000 ft. Actually, as reported in the 'GAS JOURNAL' of June 30, on June 23 gas showed at 791 ft. in the 'Portland Formation' of sub-strata—a favourable sign that a worth-while deposit may be awaiting discovery.

Reasons for the Gas Council's exploration are well known. Chief among them are the soaring price of coal for carbonising and the increasing scarcity of good carbonising coals. Discovery of natural gas in substantial quantities in the United Kingdom will be hailed with relief and with delight. And with the possibilities, many of those engaged in the British gas industry will be anxious to become better acquainted with the science and technology of natural gas production, transmission, and subsequent use. In this regard we would call attention to the establishment by the Institute of Gas Technology, Chicago, of a Home Study Course on 'Natural Gas Production and Transmission.' This coursé of study, inaugurated in 1953, has already proved itself a valuable aid in the training of men in the gas industry in the United States.

A Co-operative Enterprise

The course in question is for those students and gas undertaking personnel who are unable to attend classes at the Institute. It has been prepared in co-operation with the American Gas Association, which appointed a committee to act in an advisory capacity. This co-operation, and the help of gas industry specialists as contributors and 'reviewers,' have given a stamp of authority to this comprehensive course. The basic idea of this carefully considered plan has been to present, through a series of manuals, technical information in such a form that it can be understood by those with little or no training in the subjects covered.

The I.G.T. course comprises eight sections, each of two chapters, with a final section containing a chapter dealing with legal considerations and forms of organisation of natural gas undertakings, and an index to the whole. Set out early in the text of the course are the fundamental chemical, physical, engineering, and geological aspects of the subject. The treatment is straightforward, and the method of presentation certainly makes it easy to assimilate the underlying principles. The student then progresses in sequence through each phase of gas production, conditioning, and transmission. The economics of the system are cogently discussed. The work as a whole constitutes 'potted knowledge' at its best. It has its limitations, of course. As would be expected, academic credits are not awarded to those who enrol for this particular study, which is offered to all who wish to undertake it; there is no bar as to previous educational attainments. But these limitations strengthen rather than weaken the merits of this I.G.T. natural gas educational scheme.

The course is offered in a most interesting and very practical way designed to suit the needs and circumstances of individuals or groups, and to fit into the training schemes of gas undertakings. Broadly, there are three methods of taking the course.

Meeting Varying Needs

First, there is individual enrolment. The student pays a set amount and is then supplied with the complete work. He is expected to study each chapter, consult as many of the references given as he can, and submit a written report on each 'assignment.' The 'assignment' consists of a series of questions at the end of each chapter. Chapter V, for example, covers 'geological fundamentals'; and we find that, among the questions which the student has to answer, he is asked to discuss how oil and gas are trapped in reservoir rocks, and what geophysical methods enter into exploration. Chapter VI deals with production; and in the 'assignment' the student is asked to estimate the cost of wells, to discuss types of drilling, and so on. This gives, very briefly, an idea of the 'conduct' of the course. Reports from the students are graded by a member of the Institute's staff and returned with constructive criticisms. The student is required to complete the course within two years of his enrolment. The average student should without any difficulty be able to complete it satisfactorily in 12 months. Satisfactory completion is recognised by the award of a certificate by the Institute.

Gas undertakings which encourage their employees to take the course can effect saving for each student by securing a minimum of enrolments and paying under a graduated scale. Other plans include an individual instalment system, and purchase of the 'text' without provision for further instruction or the award of a certificate. There is also a 'group plan,' under which a group leader designated by the gas undertaking must assume responsibility for all necessary guidance and supplementary instruction of members of his class, including grading of papers, and criticisms. The 'group plan' carries with it award of the Institute certificate.

Clear and Precise Presentation

We have referred specifically to Chapters V and VI of the course, which we have read with pleasure and profit. As we have indicated, treatment of the subject-matter is simple and unambiguous. Following a short introduction on what the science of geology implies, Chapter V quickly gets down to explanation of rock types, of the 'geological time table' of North America, the origin of oil and gas, types of rock structures, and methods of exploration—gravimetric, magnetometric, electrical resistivity, gamma-ray, neutron, seismographic, and—a new technique extending the use of the surface method—aerial photography. Chapter VI is largely devoted to drilling methods, details being given of cable drill procedure and rotary drilling. Throughout, explanatory diagrams clarify the text and enable the essence of the story to be grasped readily. 'Natural Gas Production and Transmission' as a whole is an excellent guide and reference, and it should find a useful place in public libraries and in schools.

Before now we have had occasion to congratulate the Institute of Gas Technology on its enterprise in collaboration with the American Gas Association and the American gas industry in general. Further particulars concerning 'Natural Gas Production and Transmission'—a welcome addition to the many services of the Institute in research and applied gas technology—may be had from the Director at 17, West 34th Street, Chicago 16, Illinois.

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Southampton Salesmanship

A pictorial record of the smart designing that has helped to raise the prestige of gas in the area of the Southampton and District undertaking.

In the last two months or so local events have given the Southampton and District undertaking of the Southern Gas Board several opportunities for exercising their sales design talents. This collection of photographs shows that their opportunities have not been wasted.

At the top of this page is a picture of the undertaking's carnival lorry, which advises the crowds lining the streets on festive occasions to 'Live on Easy Therms'. The lorry has been entered in three carnivals and awarded two prizes.

At the New Forest Agricultural Show, which 15,700 people were reported to have attended, many useful enquiries were received at the Board's tent shown in the second picture from the top.

A combination of a good, wide frontage and, perhaps, the cheerfulness of waving flags attracted another good attendance to the Southampton undertaking's exhibit at the Horticultural Show, Southampton (third from top).

But the pictures we are most proud to reproduce are those taken of the exquisite stand designed by the Publicity Department of the Board and built by the works' staff, for the Ideal Home and Trades Exhibition, Southampton. It is not surprising to learn that from this stand, a total of 138 appliances were sold and numerous enquiries received. Business amounted to £3,233. In the picture lower left, Miss. A. D. E. Browning, home service adviser for the Southampton undertaking, explains the Electrolux refrigerator to the Mayoress of Southampton, Mrs. R. E. Edmunds.

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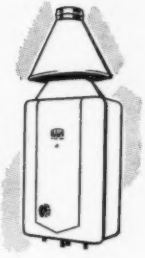

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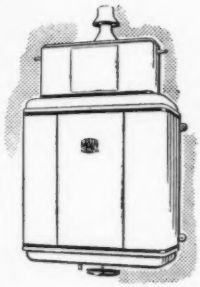

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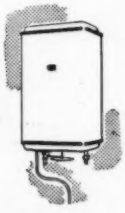


MAIN WATER HEATERS Ltd.
Gothic Works, Thornton Rd., Croydon, Surrey
W13

CHICKEN IN THE KITCHEN

In the 'GAS JOURNAL' of September 1, we published news of the Scottish Gas Board (Edinburgh Division) display at the International Poultry Congress Exhibition which has just concluded in the Waverley Market, Edinburgh.

This photograph is of the joint demonstration unit which, in addition to being used by the Gas Board and the South East Scotland Electricity Board, was also used by the Edinburgh College of Domestic Science, the Glasgow College of Domestic Science and the Women's Rural Institute.

But the design, erection and decor of the demonstration unit for both the gas and electricity boards, was placed entirely in the hands of the Edinburgh Division, Scottish Gas Board.

Harbour Pollution Allegation

Pollution of Arbroath Harbour foreshore by tar and oil effluent has been discussed by the town's Health Committee which claims that the trouble originates at Arbroath Gasworks. The town is to ask that the Gas Board install immediately two new drain filters at the plant and that its officials should inspect the installation after it has been made and at periodic intervals thereafter.

The situation in other towns is to be investigated to see how they have handled pollution from gasworks effluent, and the Department of Health for Scotland is to be asked to send an official to the town to investigate the whole position. This move in Arbroath is dictated largely by a desire to preserve amenity as a holiday resort as well as to safeguard public health.

Warmer Homes

Twenty-nine different types of the latest fires, boilers, cookers and heaters were on view at a Warmer Homes Exhibition which was opened at Plymouth on August 28 by the Lord Mayor, Alderman E. W. Perry. Situated in a marquee on a bombed site, the exhibition, organised by the Plymouth Joint Committee of the Coal Utilisation Council, was twice as large as the one held on the same site last year, when it was visited by over 10,000 people. The exhibition ran for one week.

Mr. Eric Bellingham, Director-General of the Coal Utilisation Council, said the exhibition showed the most economic use of a variety of appliances which went towards making the home warmer and happier. Training was being given to builders' fixers to see that apparatus was properly installed. That was a rapidly growing side of the Council's work.

Mr. W. T. Wren, Managing Director of Allied Ironfounders, Ltd., said there were 5½ mill. houses in Britain without hot water supplies and bathrooms. He believed that solid fuel appliances could supply the answer to more than half of those needs.

A work study course, which aims at increasing productivity in factories and workshops by applying scientific methods to industry, will be provided at Nottingham Technical College this winter. Each course will last for 10 weeks and will be limited to 12 students.

Diary

Sept. 9.—NORTHERN JUNIORS: Visit to Darlington Forge Works. 2.15 p.m.

Sept. 10.—SCOTTISH (WESTERN) JUNIORS: Presidential Address, G. Royden (Tradeston); Gas Showrooms, Sauchiehall Street, Glasgow, 6 p.m.

Sept. 14.—INSTITUTION OF HEATING AND VENTILATING ENGINEERS: 'Current American Practice in Heating, Ventilating, and Air Conditioning,' John K. M. Pryke; at the Institution of Mechanical Engineers, 1, Birdcage Walk, S.W.1., 6 p.m.

Sept. 14-17.—ASSOCIATION OF PUBLIC LIGHTING ENGINEERS. Annual Conference and Exhibition of Street Lighting Apparatus and Equipment. Eastbourne.

Sept. 16.—SCOTTISH ASSOCIATION OF GAS MANAGERS: Annual General Meeting, Cowdray Hall, Aberdeen, 'Developments in the Distillation of Scottish Coals,' C. A. Poulson; 'Strictly Business, R. J. Gregg, Publicity Manager, Gas Council. Golf and Bowling Competitions on Sept. 15; Annual Outing on Sept. 17.

Sept. 17.—BRITISH JUNIOR GAS ASSOCIATIONS JOINT COUNCIL: Meeting in London under the auspices of the Eastern Junior Gas Association.

Sept. 20.—WEST MIDLANDS G.C.C.: Gas Offices, Birmingham. 2.15 p.m.

Sept. 20.—EASTERN G.C.C.: Connaught Rooms, Kingsway, W.C.2. 2 p.m.

Sept 22.—MANCHESTER AND YORKSHIRE JUNIORS: Joint Visit to Tingley Gasworks.

Sept. 22.—WALES AND MONMOUTHSHIRE SECTION, I.G.E.: Annual General Meeting, Swansea.

Sept. 22-23.—IRISH GAS ASSOCIATION. Annual Meeting. Bundoran, Co. Donegal. Presidential Address, R. F. Pollock (Enniskillen); 'Gas Manufacture by the Tully Process,' J. E. Tully; 'Gasification Plant Developments,' N. J. Robertson.

Sept. 23.—EAST MIDLANDS GAS BOARD SALES AND SERVICE CIRCLE, Notts. and Derby Division, Annual General Meeting. Nottingham. Speaker: W. Burnstone, Chief Assistant Solicitor, Area Headquarters, on 'Legal Aspects.'

Sept. 25.—EASTERN JUNIORS: Presidential Meeting, St. Albans. (Ladies invited.)

Oct. 1.—SCOTTISH (WESTERN) JUNIORS: Jubilee Dinner, Burlington House, Bath Street, Glasgow, 6.45 p.m.

Oct. 2.—WESTERN JUNIORS: Visit to Hollacombe Works, Torquay; paper by a Representative of Staveley Coal & Iron Co., Ltd.

Oct. 5.—INSTITUTION OF GAS ENGINEERS: Murdoch Memorial Lecture, Dr. Alexander Fleck (Chairman, I.C.I., Ltd.), at Royal Institution, 6 p.m. Admission by ticket only.

DOUGLAS CARNIVAL FLOAT

The Douglas Gas Light Company sent us this photograph of their entry for the Douglas Carnival. A highly-sprung Mr. Therm bobbed violently up and around to attract attention.

Trade News

Ascot Burners

The Ascot RS52/1 boiling water heater will, from now on, be fitted with a stainless steel rosette burner of the same type as that fitted to the Ascot 503 series of sink heaters.

There are three outstanding advantages. Firstly, the stainless steel burner resists corrosion and therefore needs servicing only at very long intervals. Secondly, this burner has pierced pinholes which, being more accurate than drilled, give a perfect flame picture. And lastly, standardisation of burners throughout the Ascot sink heater range simplifies the stocking of spare parts.

Hurseal, Ltd.

Mr. A. C. Hazel, Managing Director of Hurseal, Ltd., Gulf Radiators, Ltd., and other heating companies, has recently returned from a visit to Scandinavia, where he has been examining methods of heating and visiting research establishments. He reports that the Scandinavians are studying comfort standards and investigating the proportion of radiation and convection required for true comfort. He concludes that in a climate such as ours and in homes as poorly insulated as our own, the proportion of radiation to convection should be roughly 50 : 50. It follows that heaters with the largest surface area are likely to be most suitable for the British climate. Hurseal claims that its domestic boiler has the highest efficiency of any coke fired boiler. —*Hurseal, Ltd., 229-231, Regent Street, W.1.*

Refractory Products

Refractory products which are receiving wide acceptance by the gas industry were those demonstrated by Xzit (G.B.), Ltd., at a Press reception on September 2. This young company manufactures in Great Britain products which originated in America and which seem likely to repeat in this country the success they achieved in the States.

Designed for bonding, coating and patching of refractory bricks, these products have the effect of considerably prolonging their useful lives and are suitable for use in all types of boilers and furnaces with fire-clay, grog, high alumina-content bricks, as well as many special bricks, provided that the silica content is below 75%. 'Brickseal' refractory materials can be divided into two groups—air setting and vitrifying products. In the former, the air setting products will harden at atmospheric temperatures and their use is limited only by their refractoriness. This group comprises 'Brickseal Bond,' 'Brickseal H.T. Coat,' and 'Brickseal' patching mortar. 'Brickseal Bond' is a general purpose product which is most suitable for jointing, coating and patching bricks. It has all the qualities required in a high-duty bonding and coating material, such as high refractoriness (3,200°F.), a coefficient of expansion which is equivalent to that of the majority of refractory bricks, and great bonding strength. This last quality is confirmed by results obtained in the American standard method of test for bonding strength of air-setting refractory mortar which shows a modulus of rupture for 'Brickseal Bond' of 283 lb. per sq. in.; the A.S.T.M. specification requires a mortared joint to have a modulus of rupture of not less than 200 lb. per sq. in., and 'Brickseal Bond' is the only material available in the market that complies with these requirements. Maximum operating temperature is 3,200°F.

From practical experience, it has been found that while bonding the bricks into what is in effect a monolithic structure, this material will allow the brick work to expand and contract freely, and withstand vibration without damage.

Also becoming increasingly used in the gas industry is 'Brickseal H.T. Coat,' a refractory material with a wide range of operating temperatures air-setting up to 3,600°F. It is, therefore, particularly suitable in water-gas plants, and where a high finish to insulating and other refractories is required. It is supplied ready mixed, the consistency being something akin to thin porridge, which permits easy application with a brush.

Certain gas boards are experimenting with other Xzit products, such as anti-corrosion coatings which may be used for, among other things, underground pipes. It is also possible that Xzit soot and sludge removers and degreasers may find considerable field of opportunity in this industry.—*Xzit (G.B.), Ltd., 175, Piccadilly, London, W.1; Invicta Works, East Malling, Kent.*

Dust Collection

Features of the 'Tubix' multi-cyclone dust collector include the special arrangement of the cyclones and the decantation of large particles into a primary hopper. It is claimed that the design of the collector has made available to many industries economical and efficient equipment characterised by easy operation, compactness, and simplicity. Points about the 'Tubix' design are that the coarser particles do not enter the cyclones, that high recovery efficiencies are achieved with low velocities, and that maintenance costs are low. We are informed that, apart from periodical emptying of the hoppers—which operation can, if required, be automatic—the only attention needed is an annual check when repainting. An illustrated brochure giving particulars of the 'Tubix' is available on application to *Thermix Industries, Ltd., 29, Grosvenor Place, London, S.W.1.*

Keith Blackman Publications

Three new publications have been issued by Keith Blackman, Ltd. Publication No. 28 (second edition) is a revised list dealing with the 'Tornado' bifurcated range of fans designed to handle obnoxious fumes, dust laden air, or gases at normal or relatively high temperatures. The major advantage with this type of unit, which is now available in sizes ranging from 10 in. to 25 in. diameters, is that the fan casing is bifurcated or divided to accommodate the motor in complete isolation from the fumes or gases being handled. Publication No. 30 (second edition) is another revised and improved catalogue relating to the 'Tornado' range of high efficiency axial fans (type AFX) which are V-rope driven by an externally mounted motor. Publication No. 31 is the first edition of a catalogue which illustrates and describes Keith Blackman's contribution of air moving equipment to the marine world. Copies are available from T. J. Hodgson, Publicity Chief of *Keith Blackman, Ltd., Mill Mead Road, Tottenham, N.17.*

Sankeys' Fire Cements

Offered free to interested readers is a leaflet giving particulars of Sankey's Pyruma and Aluma fire cements and Siluma hot patching cement. This is stated to be even more comprehensive than the previous leaflet. It is generally acknowledged that in the majority of furnaces, the most durable refractory linings are those built of firebricks and the firebricks jointed with an appropriate and efficient fire cement. The makers claim that joints of Sankey fire cement thoroughly bind the firebricks together. They set to rock-hardness and do not crack or crumble. They maintain their bonding power under high and varying temperatures.—*J. H. Sankey and Son, Ltd., Ilford, Essex.*

Corrosion-Resisting Priming Coat

We have received particulars of a new paint primer which the manufacturers are confident constitutes an important advance in the fight against corrosion.

It is recognised that, to protect structural iron and steel work, the priming coat is one of the most important factors in the selection of a paint system. An effective primer contains red lead powder dispersed in a vegetable oil medium. The two react to give a 'soap formation.' Primers of this nature, however, are prone to be attacked by the solvents in some of the more important finishing coats.

To make a primer as resistant as possible to such finishes, one of the methods employed has been to allow long hardening periods before applying the finishes. Alternatively, by the incorporation of red lead in rapid-drying media—such as chlorinated rubber—quick drying primers can be obtained. In such media, it is contended, no soap formation takes place and that, consequently, such media are not rust inhibitive. The suggestion is also advanced that pigments such as iron oxide, used with rapid drying media, usually containing a small amount of oil, are inert and do not react with the oils, for which reason they cannot be regarded as rust inhibiting primers.

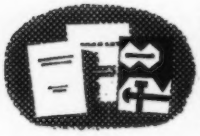
The foregoing were among the problems tackled by the laboratory division of Evode, Ltd. A further factor considered was that some primers and paints which could be applied to damp surfaces were, when dry, affected by moisture because of the water-sensitive additives they contained.

Following much experiment the firm evolved 'Evo-Led'—a primer for use under strong solvent-based paints such as chlorinated rubber and bituminous paints. We are informed that stringent tests have shown that 'Evo-Led' primer can be safely overpainted in 24 hours. It contains a high proportion of vegetable oils together with red lead powder, so that there is complete 'soap formation' and consequent rust inhibition. 'Evo-Led' can be applied to moist surfaces without, when dry, being subsequently affected by moisture. The primer displaces the moisture from the surface, absorbs it, and then allows it to escape with the solvents during the process of drying. The physical and chemical reaction which takes place in the film during drying is irreversible and the dry film cannot absorb water.—*Evode, Ltd., Stafford.*

see us about NUTS and bolts too!

You don't need to look very hard for a reliable supplier of bolts and nuts—Lanarkshire can fill most needs and keep good delivery dates. Try the service for yourself; write now for fully descriptive literature on our products.

Black, bright, non-ferrous bolts and nuts and high tensile bolts, too, by:

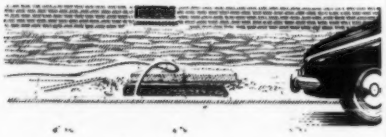


Our "Monthly Stock List" keeps buyers right up to date with the supply position. If you are not receiving your copy please ask to be put on the mailing list.

the LANARKSHIRE
BOLT & RIVET COMPANY LIMITED
Burnbank, Lanarkshire, Scotland. Tel.: Hamilton 1241-4

CROSS THE ROAD—*BELOW THE TRAFFIC*

ELIMINATE HOLD-UPS AND UNNECESSARY EXCAVATIONS



For underground pipe and cable installations, the Pass Hydraulic Thrust Borer affords a choice of four speeds of operation. The thrust of 1½ tons per square inch is conveyed by means of hydraulic cylinders moving along fixed rams. Boring can be effected without traffic hold-ups and costly excavations are eliminated. Fully informative literature is available and will be forwarded on request.

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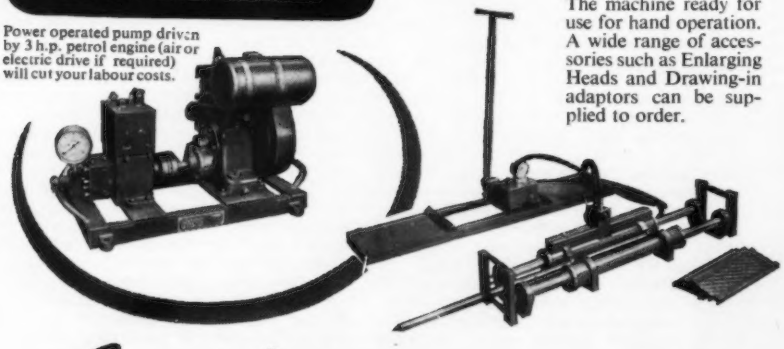
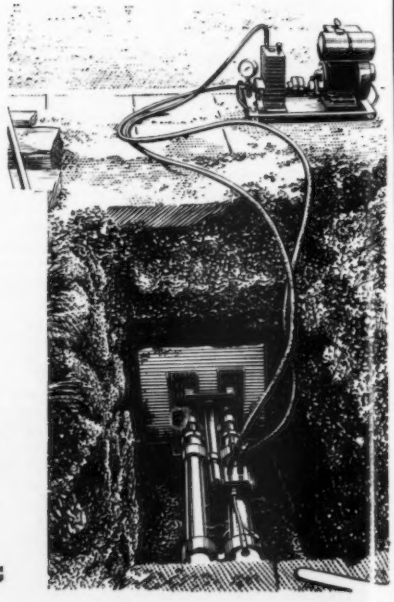
HYDRAULIC THRUST BORING MACHINE

Power operated pump driven by 3 h.p. petrol engine (air or electric drive if required) will cut your labour costs.

The machine ready for use for hand operation. A wide range of accessories such as Enlarging Heads and Drawing-in adaptors can be supplied to order.





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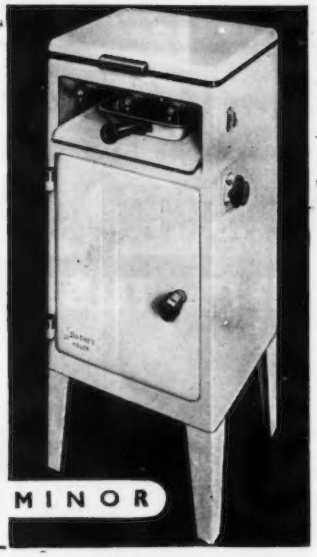
E. PASS & CO. LTD. DENTON . MANCHESTER . *Tel.*: Denton 3001/2/3 . *Grams*: Tools, Denton, Manchester.

dm PA 39

BIG Capacity for LITTLE Kitchens

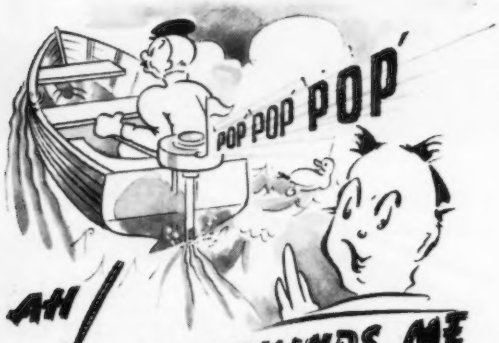
Especially suited to the kitchens of flats and small houses, this highly efficient cooker provides utmost cooking capacity in the least possible space. Cast iron construction ensures strength and durability and reduces maintenance costs to a minimum, thus making the Dainty Minor particularly suitable for simple hire or hire purchase.



Approved and adopted by leading gas boards

The **Dainty** MINOR

R. RUSSELL & SONS, LTD., DERBY
Agents for Scotland and Northern Ireland:
JAMES R. THOMSON & CO. LTD., 41, YORK STREET, GLASGOW, C.2



AH! THAT REMINDS ME

An outboard motor boat is ideal for popping about in, and is very useful for helping you to go where you want—when you want. The "Pop" riveting gun is similarly useful—especially when there are large amounts of riveting to be done. One operation from one side of the work only and rivets go home speedily and securely, in places inaccessible by other methods. The "Pop" system of riveting is the modern way of riveting, ensuring greater production.
Consult our technicians for help on all jointing problems.

'POP' is a Regd. Trade Mark of the Manufacturers

ONE OPERATOR OPERATION

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'POP' RIVETS REG'D TRADE MARK

THE MODERN SYSTEM OF RIVETING

"I like these PYREX Beakers because..."

"... they are so much stronger, and last so much longer."

"How is that?"

"Well you see, Sir, because of their low coefficient of expansion, they can be made of much thicker glass. Those wafer-thin beakers are so easily broken. We save pounds a year in the lab. by using PYREX!"

Yes indeed! PYREX borosilicate glass Beakers and Flasks are robust and shock-resisting. Heat and acid-resisting too. Coefficient of expansion 3.2 x10⁻⁶. . . almost nothing!

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● *Large new catalogue FREE. Send name, address, and position in firm.*

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COMPRESSORS & EXHAUSTERS FOR AIR AND GAS.
See our Advertisement Next Week.
REAVELL & CO. LTD. IPSWICH.

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Quarterly Volumes of the 'Gas Journal'
7/6 each, post free
Walter King, Ltd., 11, Bolt Court, Fleet Street, London, E.C.4.

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Calibrated Jets & Injectors
to meet a specification of consumption
A1
AMAL LTD., HOLDFORD ROAD, WITTON, BIRMINGHAM, 6

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Write for particulars of how E. B. Service can help in reducing maintenance costs. Manufacturers of all types of Cements.
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RUSSELL BROS (WALSALL) LIMITED
BRADFORD TUBE WORKS · WALSALL · ENGLAND
The Bradford Tube Works occupies a factory area of some three acres exclusively devoted to the manufacture of Steel Tubes and Fittings.
Contractors to Admiralty and War Office. Extensive stocks.
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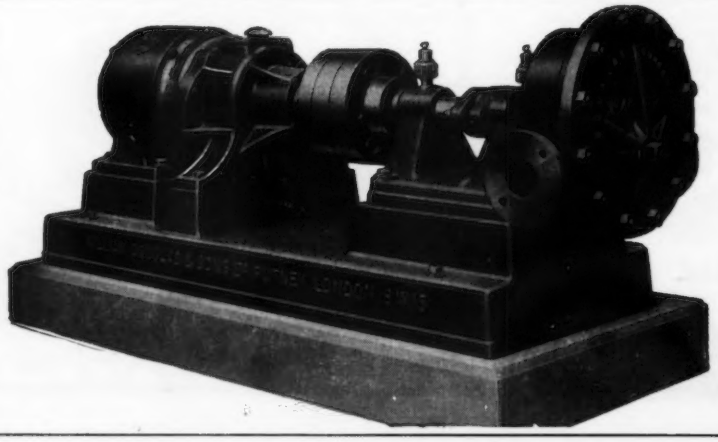
VALVES for Gas, Steam, Water, Oil and Air


"THE DOUGLAS PUMP"
STEAM HEATED FOR TARS.
GOOD SUCTION SLOW SPEED
WILLIAM DOUGLAS & SONS LTD.
PUTNEY - - LONDON, S.W.15

PUBLISHERS' NOTICE

The "Gas Journal" is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the "Gas Journal" Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words)—minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep × 7" wide; block screen 120.

BUSINESS MANAGER : S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30. Telephone: Kings Norton 3868

NORTHERN MANAGER: Philip W. B. King, address for present c/o 11, Bolt Court.

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SPECIALLY ACTIVATED OXIDE OF IRON

Oxide supplied on loan or sale outright.
Highest prices paid for Spent Oxide.

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FREE BOOKLET FOR YOU ON

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Fascinating, new, multi-coloured brochure, "Fire!—Your Dangerous Servant," can be yours. It tells you why to get Nu-Swift before your fire risk becomes 3-dimensional. Send for it—NOW!

NU-SWIFT LTD · ELLAND · YORKS

In Every Ship of the Royal Navy

"KLEENOFF" *

THE COOKER CLEANER

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FIBRE BRUSHES
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KETTLE DESCALER

For resale to the public, and in bulk for Works use.

BALE & CHURCH, LTD.

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PUBLICATIONS

GAS ACCOUNT CALCULATORS

SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 354, WHEELER STREET, BIRMINGHAM.

'Phone: Northern 0989. 'Grams: Reckoners, Bham.

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FIRST CLASS Agencies wanted sales executive wide experience top qualifications valuable contacts. S. England, C.I. Apply: No. 210, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

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(Director, B. T. King, A.I.M.E., Patent Agent)
Advice, Handbook, and Consultations free. 146a, Queen Victoria Street, London, E.C.4. 'Phone: City 6161.

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.

NATURAL BRITISH.

BOG (DUTCH and DANISH) ORE.

SPENT OXIDE.

LONDON ROAD, LEICESTER.

Telegrams: "BRIPURIMAT"
Telephone: 59086

APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

WEST MIDLANDS GAS BOARD

WOLVERHAMPTON AND DISTRICT DIVISION
NEW HOUSING REPRESENTATIVE

THE successful candidate will be attached to the Divisional Office at Dudley and will be required to co-ordinate the work of Districts and assist in interviewing local authorities, architects, builders and prospective purchasers of new property, so as to promote the installation and sale of gas appliances.

The salary will be within Grade VIII (£605-£685 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, qualifications and experience, together with details of present and previous appointments, and the names of two referees, should be addressed to Mr. Stanley Jones, Divisional General Manager, West Midlands Gas Board, Kensington House, Bath Street, Dudley, Worcs., to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

SCOTTISH GAS BOARD

NORTHERN DIVISION
APPOINTMENT OF MANAGER TO FRASERBURGH DISTRICT

APPLICATIONS are invited for the position of Manager of the Fraserburgh District Gas Undertaking from qualified Gas Engineers experienced in modern Gas Works and distribution practice and in the supervision and administration of a medium-sized Undertaking.

The salary applicable to the post, which includes certain responsibilities for neighbouring Undertakings in the Sub-Group, is £695-£795 per annum, with free house and fuel allowance.

The successful candidate may be required to pass a medical examination.

Applications giving full particulars of age, qualifications and experience, together with copies of *three* recent Testimonials, should be lodged with the undersigned not later than Monday, September 20, 1954.

H. S. MILNE,
Divisional Controller.

50, Cotton Street,
Aberdeen.
August 31, 1954.

(*Classified advertisements continued on page* 602)

APPOINTMENTS VACANT (ctd.)

WEST MIDLANDS GAS BOARD

WARWICKSHIRE DIVISION
MECHANICAL AND ELECTRICAL ENGINEER—
FOLESHILL GAS WORKS, COVENTRY

APPLICATIONS are invited from suitably qualified persons for the above post.

Candidates should have had extensive practical experience of the installation and maintenance of mechanical and electrical plant and equipment. Experience of gasworks practice would be an advantage.

Accommodation will be available at a reasonable rental.

The commencing salary will not be less than £1,000 per annum.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

TECHNICAL ASSISTANT TO
DIVISIONAL ENGINEER
BIRMINGHAM DIVISION

APPLICATIONS are invited for the post of personal TECHNICAL ASSISTANT to the DIVISIONAL ENGINEER, which offers experience over a wide field of technical and administrative work.

Candidates must be corporate members of the Institution of Gas Engineers and possess either an Engineering Degree or a Gas Engineering Diploma. Previous experience in a responsible position on a large gas works would be an advantage.

The commencing salary will be £1,040 per annum, rising, subject to satisfactory service, to £1,225 per annum.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, training, qualifications and experience, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

DRAUGHTSMAN—
HEADQUARTERS STAFF

A VACANCY has occurred for a DRAUGHTS-MAN on the Board Headquarters Staff, located in Birmingham.

Candidates should possess the Higher National Certificate in Mechanical Engineering (or equivalent) and have had a sound engineering training and be competent to prepare drawings, specifications and estimates for the installation of Gas Works plant. Previous experience in this type of work is essential.

The salary will be within Grade IX (£635-£735 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications stating age, present position, experience, general and technical education and certificates held, together with the names of two referees, should be addressed to the Industrial Relations Officer, West Midlands Gas Board, 6, Augustus Road, Edgbaston, Birmingham, 15, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

WORCESTERSHIRE-HEREFORDSHIRE DIVISION

ASSISTANT ENGINEER AND MANAGER
HEREFORD DISTRICT

APPLICATIONS are invited for the above post from qualified Gas Engineers, who should be familiar with first class Gas Engineering practice and with plant of modern type.

The salary will be within Grade X (£690-£790 per annum) of the National Salary Scales for Gas Staffs.

It is likely that a modern house will be available on a service tenancy.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications giving details of training, academic qualifications and practical experience, together with the names of two referees, should be sent to Mr. C. F. W. Rendle, Divisional General Manager, West Midlands Gas Board, 12, St. Nicholas Street, Worcester, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

WEST MIDLANDS GAS BOARD

NORTH STAFFORDSHIRE DIVISION

ASSISTANT DISTRIBUTION SUPERINTENDENT—
STAFFORD DISTRICT

CANDIDATES should have a sound knowledge and practical experience of main and service laying, the installation, maintenance and repair of gas appliances, the control and supervision of workmen, and the general administration of a gas distribution department.

The salary will be within Grade VI (£510-£590 per annum) of the National Salary Scales for Gas Staffs.

The post is pensionable and the successful candidate may be required to pass a medical examination.

Applications, stating age, present position, details of experience, and the names of two referees, should be addressed to Mr. J. E. Stanier, Divisional General Manager, Etruria Gas Works, Stoke-on-Trent, to reach him within fifteen days of the appearance of this advertisement.

F. H. CURETON,
Secretary to the Board.

EAST MIDLANDS GAS BOARD

SHEFFIELD AND ROTHERHAM DIVISION

ASSISTANT DISTRIBUTION SUPERINTENDENT

APPLICATIONS are invited for an ASSISTANT DISTRIBUTION SUPERINTENDENT for the Sheffield District. Applicants should have had considerable practical experience of mains and service laying and possess a good knowledge of modern distribution practice. They should be Corporate Members of the Institution of Gas Engineers or possess an equivalent qualification. The salary will be in accordance with A.P.T. VIII or IX of the National Salary Scales for Gas Staffs up to a maximum of £735 per annum and the initial placing will be dependent upon qualifications, experience and ability.

The position is pensionable and the successful applicant may be required to pass a medical examination.

Applications, stating age and giving details of qualifications and experience, together with the names of two referees, should be addressed to reach the undersigned not later than September 30, 1954.

C. C. WOOD,
Divisional General Manager.

Gas Offices,
Commercial Street,
Sheffield, 1.
September 2, 1954.

NORTH EASTERN GAS BOARD

HEAD OFFICE
JUNIOR TECHNICAL ASSISTANT—
INSTALLATIONS SECTION

APPLICATIONS are invited for the above position at the Head Office of the Board, at a salary within Grade A.P.T. V, Provincial 'A', £480-£560 per annum of the Scales of the National Joint Council for Gas Staffs. The appointment will be subject to a satisfactory medical examination and participation in the Board's Staff Pension Scheme.

Applicants should hold the City and Guilds Full Technological Certificate in the Technology of Gas Supply or equivalent qualification and have had some experience in the utilisation of gas for domestic and commercial purposes. Experience of internal carcassing appliance installation and meter maintenance and repairs would be an advantage.

Applications giving age, qualifications, training and experience, should be sent to the Chief Commercial Officer, North Eastern Gas Board, Bridge Street, Leeds, 2, by September 13, 1954.

J. C. GARDNER,
Secretary.

Bridge Street,
Leeds, 2.
September 2, 1954.

NORTHERN GAS BOARD

TEES-SIDE DIVISION
MIDDLESBROUGH UNIT
CHEMIST

APPLICATIONS are invited from suitably qualified persons for the above appointment.

Candidates should have had experience in the laboratory of a Modern Gas Works and possess a knowledge of the control of gas manufacture. Experience in testing of domestic and industrial gas appliances will be an advantage.

The salary for the post will be in accordance with Grade 5, Provincial 'A', *i.e.* £480-£560 per annum.

The successful candidate will be required to pass a medical examination and be subject to the Board's Staff Superannuation Scheme.

Applications stating age, education, qualifications and experience, with the names of two referees, should be submitted to the undersigned not later than Saturday, September 25, 1954.

JOHN W. PALLISTER,
Divisional General Manager.

Gas Works,
Commercial Street,
Middlesbrough.

NORTH WESTERN GAS BOARD

NORTH CHESHIRE GROUP
ELECTRICAL SUPERINTENDENT—
DENTON NEW WORKS

APPLICATIONS are invited for the above pensionable appointment at a salary within Grade A.P.T. IX (£635-£735 per annum).

Applicants should have experience in the operation and maintenance of electrical equipment on a gas works, including 1,200 kW turbo-alternators, 6.6 kV, 3.3 kV and 440 V distribution systems, electric motors and starters up to 500 h.p.

Detailed applications, giving the names of two referees, should reach the General Manager, North Western Gas Board (North Cheshire Group), Gas Works, Portwood, Stockport, within fourteen days.

NORTH WESTERN GAS BOARD

LIVERPOOL GROUP
SENIOR INSTRUMENT ENGINEER

APPLICATIONS are invited for the above pensionable appointment, at the Central Laboratory, Wavertree Works, Liverpool, at a salary within Grades A.P.T. XI or XII (£715-£840 or £765-£890 per annum) according to qualifications and experience.

Applicants should possess suitable technical qualifications in physics or electrical or mechanical engineering, minimum standard Higher National Certificate, and should have a wide experience of installation, maintenance and calibration of all types of industrial instruments. Ability to supervise an Instrument Section covering all the works in the Group is essential.

Apply by letter to the Chief Personnel Officer, North Western Gas Board (Liverpool Group), Radiant House, Bold Street, Liverpool, within fourteen days.

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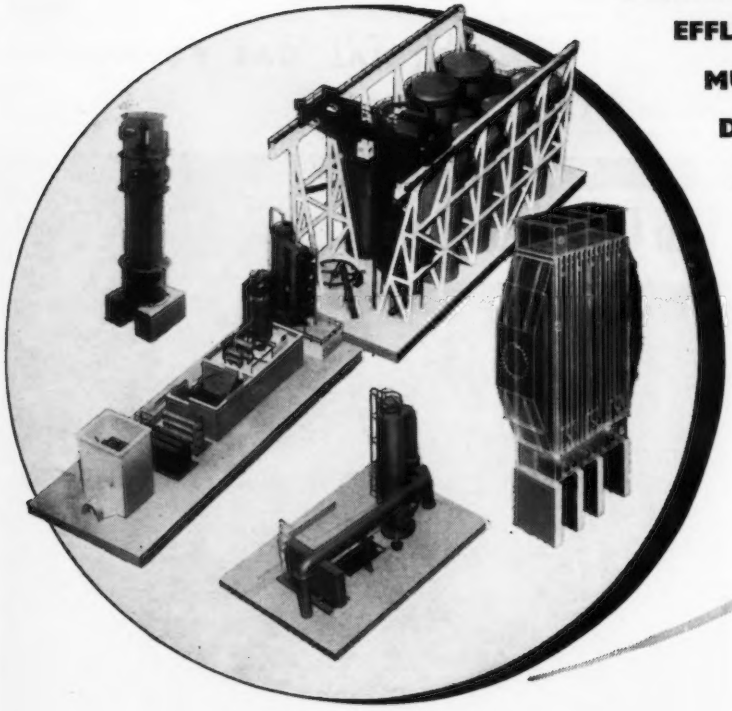

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C2181-1

industrial gas compressors

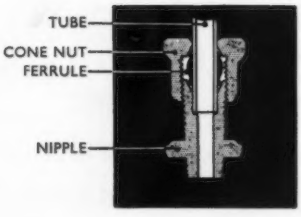
FOR COMPRESSING AIR OR GAS SUPPLIES USED FOR FURNACE HEATING, METAL MELTING, BRAZING, SOLDERING BITS, LAUNDRY IRONS, ETC.

DIRECT COUPLED COMPRESSORS (see *illustration right*) *are fitted with automatic internal by-pass valves and lubrication systems. They are direct coupled to Keith Blackman motors. Type OA compressors in this range occupy a floor space of only 18" x 7½".*
CAPACITY RANGE: *100 to 750 cub. ft. of gas or air per hour at 3 lbs. per sq. in. pressure.*

TYPE 4 COMPRESSORS (*not illustrated*) *are also fitted with automatic internal by-pass valves and lubricators. The complete unit includes motor and drive on a common bedplate, all of Keith Blackman manufacture.*
CAPACITY RANGE: *500 to 20,000 cub. ft. of gas or air per hour at 3-5 lbs. per sq. in. pressure.*
AREA OCCUPIED: *from 9¼" x 16½" to 61" x 27".*

DID YOU KNOW?

KEITH BLACKMAN have been making compression joints for many years and the present design embodies features developed as a result of this long experience. *Notice that the shape of the ferrule is such that the joint is made without unduly stressing the tube.*



serving to burn

Note: the four burner heads (right) are for high pressure gas, or low pressure gas and air blast.

LEFT: "Fishtail" type burner *with two-armed stamped pattern injector for heating liquid in tanks by submerged combustion tubes. For use with low pressure gas supplies.* **Size Range:** *1", 1¼", 1½", 2" and 2½" outlets.* **Capacity Range:** *45-280 cub. ft. of gas per hour.*

Brass non-blow-off head types: *deal with 5 to 10 cub. ft. of gas per hour.*

Stainless steel, "F" type head, burner: *deals with 8 cub. ft. of gas per hour.*

Perforated head type burner: *deals with 10 to 15 cub. ft. of gas per hour.*

INDUSTRIAL GAS EQUIPMENT

524

Keith Blackman LIMITED

MILL MEAD ROAD, TOTTENHAM, LONDON, N.17

'Phone: Tottenham 4511 (twelve lines). 'Grams: "Keithblac, Norphone, London."

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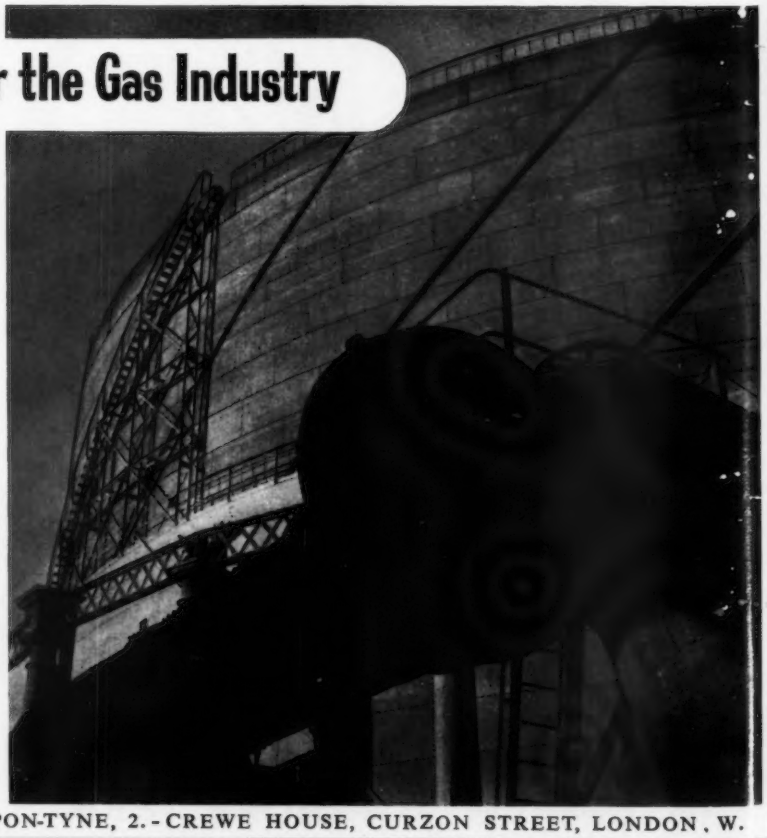
Photograph by courtesy of the Gas Council

Aluminium Paints for the Gas Industry



"LUMEROS X" High Heat Resisting Paint.
Represents the latest and greatest advances in the protection of iron and steel subject to very high temperatures. "LUMEROS X" gives adequate protection at temperatures up to 600°C. Suitable for indoor and outdoor use. Good water resistance. No undercoat required. Available in Aluminium or Black.

"METTAL" Aluminium Paint.
A general purpose paint of the highest quality and durability and possessing great brilliance. For indoor and outdoor use. Whilst not specifically designed as a heat resisting coating "METTAL" will stand temperatures around 212°F (100°C).

"METTAL" (Thermal).
Specifically designed for indoor and outdoor use on metal surfaces up to 350° F (177°C).

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